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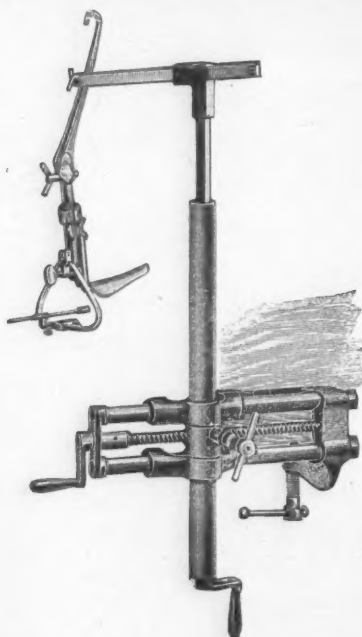
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# THE LARYNGOSCOPE.

VOL. XXVI. ST. LOUIS, DECEMBER, 1916. No. 12.

## ORIGINAL COMMUNICATIONS.

(Original Communications are received with the understanding  
that they are contributed exclusively to THE LARYNGOSCOPE.)

### CEREBELLAR ABSCESS: SYMPTOMS AND DIFFERENTIAL DIAGNOSIS.\*

DR. PHILIP D. KERRISON, New York.

The subject assigned to me is so extensive and many sided that only the briefest outline is possible in the time at my disposal.

There is so much yet to be learned as to cerebellar function and physiology that we shall do well to be modest in speaking even of that which is known. Confining our statements strictly to established facts, however, we know: that of the suprasegmental or evolutionary brain structures, the cerebellum biologically antedates the cerebrum; that its activities are wholly reflex and subconscious; that the afferent impulses to the cerebellum are purely sensory and fall roughly under two heads, viz., "*proprioceptive*," or conveying impressions of the changing relations of various parts of the body to each other, and "*exteroceptive*," relating to the changing positions of the body in space; that the cerebellar function is the correlation and analysis of these various sensory impulses, and their conversion into efferent impulses having to do with the motor co-ordination and control necessary to normal dynamic and static equilibrium.

We know that as with the cerebrum so also in the cerebellum there are so-called "blind" regions of very considerable extent, injuries confined to which cause no characteristic disturbances of function. Hence the many cases of cerebellar tumor or abscess without focal

\*Read before the Pennsylvania State Medical Society on September 20, 1916.

symptoms. Appended to this paper is a brief synopsis of Barany's theory as to the existence of certain cortical centers in the cerebellar cortex, injury to which causes loss of correct direction-sense in certain joints. Such disturbances can hardly be regarded as errors of muscular co-ordination since with the aid of sight the joints involved may functionate normally.

Without relation to Barany's centers, there are other structures or centers, probably located in or near the vermis, presiding over the motor co-ordination of the principal muscle groups of the same side, injury to which causes widespread homolateral inco-ordination of movement (incoordination ataxia, diadokokinesis, characteristic peculiarities of gait, etc.). The functional disturbance in such cases is purely a defect of muscular control, and apparently is due very largely to an inability to confine common voluntary movements within normal limits.

Still another condition must be mentioned because occasionally occurring with cerebellar abscess, though due actually not to structural change in the cerebellum, but to pressure upon motor tracts, viz., *hemiparesis* of arm and leg muscles (rarely paralysis) which may be bilateral, but much more frequently is unilateral and limited to the side of the lesion. This can be explained only as due to pressure upon the pons, medulla or cord. Hemiparesis limited to the side of the lesion Macewen explains by the hypothesis that under pressure by an abscess the cerebellum may be forced somewhat downward into and through the foramen magnum, in which situation either side of the medulla or even the upper end of the cord may be compressed. Either contralateral pressure above, or pressure on the same side below, the crossing of the motor tracts would explain hemiparesis on the side of the lesion.

Any effort to trace the origin of focal symptoms in cerebellar disease would seem to bring them roughly into three groups, viz., those due to (a) *injury to cortical centers controlling the direction-sense as referred to particular joints*; (b) *injury to cerebellar structures controlling motor co-ordination*, and (c) *pressure transmitted to motor tracts in medulla and cord*.

The symptoms of cerebellar abscess fall naturally under two heads, viz., *general* and *focal*.

The *general symptoms*, though of great diagnostic importance, can have only brief consideration here. The *temperature and pulse changes* are those frequently observed with abscess of the cerebrum. The most characteristic temperature chart is one which hugs the normal line with occasional variations of from a point or two above

to a point below the normal. Bradycardia is common, as with cerebral abscess. A pulse rate falling at some time within the 24 hours to 60, 50 or even 40, probably occurs in at least 33 per cent of cases. *Headache*, common to both cerebral and cerebellar abscess, attains differential significance only from this clinical observation: that the headache of cerebellar abscess, once it is established, is more constant, more persistently severe and less variable in its location than are the more indefinite head pains of cerebral abscess. *Vomiting* is probably common to the onset of all intracranial infections. After the lesion is established, however, vomiting is rare in cerebral abscess, whereas its presence as a recurring symptom is exceedingly common in cerebellar abscess. With meningitis excluded, it may, therefore, possess considerable diagnostic significance. *Nervous and mental symptoms*: Insomnia, intractible, not amenable to opiates, and inexplicable by any determinable lesion outside of the skull, is exceedingly characteristic of cerebellar abscess. When sub-tentorial pressure is markedly increased, drowsiness coupled with inability to sleep is said to characterize some cases. On the other hand, the type of mental lethargy and obscuratio, and particularly the delayed cerebration so characteristic of temporo-sphenoidal abscess are usually conspicuous by their absence. An unclouded mentality in the presence of other signs of intracranial infection would distinctly suggest a cerebellar lesion. *Eye ground changes* may or may not be present, and may be bilateral or confined to either side. According to Ruttin, papillitis, choked disk and optic neuritis occur far more frequently with cerebellar than with cerebral abscess. With this view Neumann concurs. Macewen states that optic neuritis of such grade as to cause considerable temporary loss of vision is not uncommon in cerebellar abscess. Another condition which marks the disease in certain cases is the very sudden and rapid deterioration of physical tone and condition. Usually accompanied by rapid emaciation, even more conspicuous and characteristic is the indescribable but ominous appearance of extreme and fatal illness.

In occasional association with the cerebellar headache, a condition which when present is most significant, probably has to do with the proximity of the lesion to the great nerve centers at the base of the skull; or perhaps to the hard, unyielding bone surfaces upon which the cerebellar hemispheres rest. The patient learns by experience that any sudden or jerky movement of the head causes sharp head pain or at least aggravation of the existing headache. He, therefore, in moving the body holds the head more or less

rigidly. In turning in bed, he may even attempt to minimize this effect by supporting the head with the hands. The effort to guard against head-jar may influence all the movements of the body, e. g., in walking, changing from a sitting to standing position, etc. This condition when present is, so far as I know, distinctly suggestive of cerebellar abscess.

The above outline, though meager, will suffice to indicate the importance of careful analysis of the general symptoms. For with complete absence of focal symptoms, one might in the presence of low grade fever, low pulse rate, recurrent vomiting, persistent occipital headache,—with mentality unclouded,—reach a fairly logical inference as to the site of a suspected lesion.

*Focal Symptoms:* It cannot be too frequently stated that cerebellar abscess with complete absence of focal symptoms is not very uncommon. Let us imagine, however, a case presenting all the classical focal symptoms, which may then, for purposes of description be mentioned in some regular order.

*Nystagmus:* Examination of the eyes shows nystagmus of vestibular type, that is to say, composed of a quick movement in one direction and a slow return movement in the other. Usually it is rotary or partly rotary in character. While superficially indistinguishable from the nystagmus of labyrinthine disease, it presents certain differentiating features, viz., it is not necessarily constant as to direction; usually it is a changing nystagmus, first to one side and then to the other, the changes in direction being in some cases induced by sudden movements of the head or by the direction in which the eyes are voluntarily turned. As a rule, however, the nystagmus toward the side of the lesion is stronger than that in the opposite direction. A very important differential point is its persistency; usually it is a constant, and in some cases, a gradually progressive symptom (Neumann). This alone would differentiate it from the nystagmus of acute diffuse suppurative labyrinthitis which tends regularly to progressive and fairly rapid subsidence. As the disease advances, it becomes clear that the nystagmus is without influence or bearing upon the ataxia present, or at least upon the direction in which the patient tends to fall.

*Cerebellar Ataxia:* Two kinds of static ataxia in cerebellar disease have been observed: (A) the temporary type dependent on the nystagmus present. When the nystagmus is first established, the patient naturally experiences subjective rotary vertigo in the plane of the nystagmus, and may fall or tend to fall in the direction opposite to the quick eye movement. But it is a recognized clinical

feature of cerebellar abscess that while the nystagmus is usually a constant symptom, the vertigo due to this phenomenon tends to subside and finally to disappear. After this nystagmic vertigo has subsided, there still remains in many cases a type of vertigo and disturbance of equilibrium which bear no relation to the nystagmus present. (B) This is the most characteristic type of *cerebellar ataxia*. The patient, attempting to stand or walk, falls or tends to fall in some definite and constant direction. The falling direction most frequently noted has been toward the side of the cerebellar lesion. It has no necessary relation to the nystagmus present, and is, therefore, not influenced by changes in the position of the head, as is invariably the case with ataxia caused by acute labyrinthine disease. In this form of cerebellar ataxia the falling direction is usually constant throughout the disease,—i. e., until recovery or the collapse presaging death.

*Inco-ordination Ataxia:* Unilateral muscular inco-ordination is a very characteristic, though by no means invariable, symptom of cerebellar abscess. It is shown by a lack of control or precision in the movements of the hand and arm on the side of the cerebellar lesion. It may be elicited as the patient lies in bed by asking him to touch the tip of the nose quickly first with the right forefinger and then with the left. While able to do this with normal ease and precision with the forefinger on the sound side, the forefinger corresponding to the side of the lesion may either miss the nose by some inches or is brought into contact with it only after a series of to and fro oscillations in its immediate vicinity. This, however, is only a convenient method of demonstrating this form of motor inco-ordination. Any exercise calling for fine control or exact limitation of movement,—e. g., writing, the use of the needle in embroidery, or even the effort to pick up some minute object,—may show in some degree the same type of ataxia.

*Occasional Peculiarities of Gait:* Naturally with widespread muscular inco-ordination confined to the side of the lesion—and this motor inco-ordination is always homolateral—the gait may be affected, the muscular efforts both to raise and again to lower the foot and leg corresponding to the lesion being no longer under normal cerebellar control, and, therefore, taking the form of rather jerky and even exaggerated movements.

*Diadokokinesis* (Babinski) is probably only another manifestation of the same form of motor inco-ordination. If the patient is directed to practice any common movement simultaneously with the two hands, fingers or wrists,—e. g., the finger movements as in piano practice, or rotating both wrists back and forth as rapidly as



possible,—it will be found that while one hand performs these movements easily and quickly, the hand corresponding to the cerebellar lesion executes the same movements much more slowly and with apparent labor. For example, in trying to rotate the wrists rapidly and simultaneously, in one case coming under my observation the patient executed two rotations with the wrist of the normal side to one on the side of the lesion. In another the ratio was 4 to 1. In both these cases, a cerebellar abscess was successfully evacuated. I can think of no other lesion which would be likely to give rise to this phenomenon.

A patient with a right-sided cerebellar abscess who came under my care presented this interesting symptom. She could wink both eyes simultaneously. She could wink the left eye alone; but she could not wink the right (corresponding to the abscess) alone. When she tried, she always winked both eyes.

*Loss of Pointing Accuracy* (spontaneous deviation from vertical plane), *Application of Test*: Let us suppose a case of right-sided cerebellar abscess. The patient with eyes closed stands or sits opposite the examiner, with the right arm outstretched straight in front of him and the extended forefinger in contact with that of the physician. He is told to lower his hand and arm to a dependent position and again elevate it to contact with the examiner's finger which has been held stationary in the original position. It will be found that the patient's hand, both in being lowered and again in being elevated, deviates outward so that it may miss the examiner's fingers by some inches. The left arm, similarly tested, moves in the vertical plane and is easily returned to its original position. This spontaneous outward deviation of right arm points strongly to a right cerebellar abscess. The corroborative test must now be applied.

*Method of testing the reaction to vestibular irritation*: Irrigate the left ear, i. e., the ear opposite to the suspected lesion, with cold water. This gives rise to the usual nystagmus to the right, during which, normally, both arms should deviate to the left. Now quickly, while the nystagmus is still active, test the pointing accuracy, or movement in the vertical plane, of each arm. It will be found that only the left arm moves to the left, the right arm deviating as before to the right or, at least, not being drawn as normally in the direction of the slow component of the nystagmus, i. e., to the left.

These two functional changes, spontaneous outward deviation of the right arm and loss of normal reaction to vestibular irritation, are pathognomonic of a lesion of the right cerebellar hemisphere.

While the tests of other joints are of theoretic interest, experience has shown that for practical purposes of diagnosis the above tests of the shoulder joint are sufficient; if positive, no additional light will be gained from tests of other joints; if negative, so also will be the tests of other joints.

*Hemiparesis* is present in only a small percentage of cases. When present, it is possible that a careful observer may note a comparative slowness, languor or effort in the movements of the hand and arm corresponding to the lesion. If the patient is required to squeeze the examiner's hand first with one hand and then with the other, a comparative loss of power is noted in the hand on the side of the lesion. If a more exact gauge be required, a dynamometer may be used.

This symptom, when present, may be of peculiar differential significance from the following facts: (a) In cerebellar abscess, hemiparesis is most often homolateral; in temporo-sphenoidal abscess it is always contralateral; (b) in cerebellar abscess both upper and lower limbs are involved; in temporo-sphenoidal abscess, pressure is transmitted to the motor area of face, arm and hand, and not at all, or only in the slightest degree, to that of the leg and foot; only the upper extremity is therefore involved. Facial hemiparesis is not easily detected.

*Catalepsy*: A rare symptom of cerebellar disease which I have never seen is described as a cataleptic condition of the arm and leg on the side of the lesion. It is present when the arm or leg, placed passively in some unusual position, does not yield at once to the force of gravity but holds the position sometimes during a period which would cause unbearable strain in a normal person.

*Speech Defects* are not very uncommon in cerebellar abscess. Mac-ewen describes this as a slow, labored, syllabic speech. In a case coming under my care, the patient whose mentality was throughout unusually clear, developed a peculiar lisp of which she was perfectly conscious and for which she repeatedly asked an explanation. It disappeared completely within forty-eight hours after the abscess was evacuated.

In the foregoing pages I have described an array of focal symptoms such as probably no single patient ever presented. Many cases progress from onset either to recovery following operation or to the fatal termination, without at any time exhibiting nystagmus, motor incoordination or any pathognomonic sign. In dealing with a case of suspected intracranial disease the general symptoms often suggest the clue, and we are lucky if our most careful search reveals two or even one positively focal symptom.

Last month I saw, in consultation with a confrere, an interesting case, the salient features of which were as follows: The patient had developed mastoiditis with suppurative labyrinthitis, for which first a mastoidectomy and then a labyrinth operation had been performed.

Some days following the labyrinth operation the nystagmus, which naturally had been toward the sound ear, suddenly changed its direction toward the ear operated upon.

When I first saw him, the patient showed a changing (i. e., alternating) nystagmus and had the appearance of very grave illness. The pointing tests showed no deviation of either arm. The mentality was unclouded. There were, however, moderate inco-ordination ataxia and moderate diadokokinesis of arm and hand corresponding to the side operated upon. Upon the history, the sequence of the nystagmus changes and the two focal symptoms, I strongly advised an operation, which was performed, later in the day with the evacuation of several drachms of pus.

*Differential Diagnosis:* The only two lesions with which cerebellar abscess is really likely to be confused are *cerebral abscess* and *acute diffuse suppurative labyrinthitis*. I shall omit the time-honored but misleading arrangement of symptoms in parallel columns. Instead I shall try to summarize what seems to me the most important and useful differential points.

DIFFERENTIAL POINTS BETWEEN CEREBELLAR ABSCESS AND TEMPORO-SPHENOIDAL ABSCESS.

*Recurring vomiting*, common in cerebellar abscess, is exceedingly rare in cerebral abscess.

*Nystagmus*, a frequent phenomenon in cerebellar abscess, is never caused by cerebral abscess.

*Characteristic cerebellar ataxia* with tendency to fall constantly in one direction is peculiar to that lesion, though some disturbance of equilibrium due to increased pressure may occur in cerebral abscess.

*Unilateral inco-ordination ataxia and diadokokinesis*, not uncommon in cerebellar abscess, are not characteristic of cerebral abscess.

*Hemiparesis*, occasionally present, is most often homolateral in cerebellar abscess, whereas in cerebral abscess, it is always contralateral. In cerebellar abscess both upper and lower limbs are involved; in temporal lobe abscess, the leg usually escapes.

*Speech defects*, drawl, slow "syllabic" speech, lisp, are occasional symptoms of cerebellar abscess, which are not characteristic of cerebral abscess.

*An unclouded mentality* is characteristic of cerebellar abscess; *mental dullness*, almost to obscurity but without perversion, and frequently retarded or delayed cerebration—are characteristic phenomena in cerebral abscess.

*Various forms of aphasia*, and occasional contralateral *paralysis*, which occur in some cases as focal symptoms of cerebral abscess, do not occur in cerebellar abscess.

When focal symptoms are present, the above lesions may be easily distinguished; when absent, a positive differentiation may be difficult or impossible.

#### DIFFERENTIAL POINTS BETWEEN CEREBELLAR ABSCESS AND ACUTE DIFFUSE SUPPURATIVE LABYRINTHITIS.

*Cerebellar abscess* resembles labyrinthitis only when nystagmus and associated phenomena are present, and then only the acute stage of suppurative labyrinthitis. When the acute stage of suppurative labyrinthitis has passed, all similarity disappears.

*Nystagmus* in diffuse suppurative labyrinthitis is always toward the sound ear; in cerebellar abscess, it may be alternating or in either direction, but is usually strongest toward the side of the lesion. Nystagmus tends to subside rapidly in labyrinthitis,—it is persistent and sometimes progressive in cerebellar abscess.

*Disturbances of static equilibrium*: In acute suppurative labyrinthitis, the patient tends to fall always in the direction of slow nystagmic movement and therefore toward the sound ear. In cerebellar abscess, as the disease advances, the falling direction is often quite independent of the nystagmus, and is constant in direction.

There is absolute deafness of the involved ear in diffuse suppurative labyrinthitis; in cerebellar abscess the hearing is not impaired unless the abscess is secondary to a suppurative lesion of the labyrinth.

*Caloric test*: Vestibular apparatus does not respond to irritation by heat or cold in suppurative labyrinthitis; it responds normally in cerebellar abscess uncomplicated by labyrinthine disease.

All the characteristic symptoms of the acute stage of suppurative labyrinthitis tend to subside rapidly. The symptoms of cerebellar abscess are persistent and tend to increase rather than subside.

#### APPENDIX: NOTE ON BARANY'S THEORY OF CEREBELLAR LOCALIZATION.

Barany has proved that there are in the cerebellar cortex certain definite centers which have to do with the direction-sense of particu-

lar joints; or in other words, with the ability to move certain joints without the aid of sight in certain definite planes. Each of these centers exerts upon a particular joint, or one of its controlling muscle groups a pull, or tonus, in some definite and constant direction. Thus there are separate centers which exert respectively an inward and an outward pull, or tonus, upon the shoulder and which confer upon the normal individual the ability to move the arm correctly in the vertical plane without the aid of sight. Logically in such a scheme we must assume the existence of additional centers for each joint, exerting respectively an upward and downward pull, which are necessary to correct orientation, or movement, in the horizontal plane. Thus for each of the major joints, e. g., shoulder, elbow, wrist, hip, etc., there are separate centers exerting tonuses, or pulls, in different directions. While all of these centers are assumed to exist, not all have yet been actually located or demonstrated either clinically or by experiment. Two centers which have been definitely located and which are of the greatest diagnostic importance are the centers exerting an inward pull on the wrist and shoulder respectively. The former (inward tonus upon wrist) Barany places in the middle inferior lobe (slender lobe) near the flocculus. The center exerting inward tonus upon the shoulder joint is also in the middle inferior lobe, but 10 or 12 mm. behind the former. These two centers are in close relation with that part of the posterior surface of the petrous bone lying between the sigmoid sinus behind and the internal auditory meatus in front, i. e., they are in relation to that part of the temporal bone through which an infection from the mastoid or middle ear would reach the cerebellum. Since a majority of all cases of cerebellar abscess are of otitic origin, these are the two centers most likely to be, and in fact most frequently involved.

*Loss of pointing accuracy:* The normal individual, with eyes closed, can lower either arm, outstretched in front of him, and again elevate it without appreciable deviation from the vertical plane. This may be called normal pointing accuracy.

When the center for the shoulder, inward tonus, is injured either surgically or by disease, the arm corresponding to the lesion no longer moves correctly in the vertical plane, but *deviates outward*; i. e., with a right cerebellar lesion, the right arm deviates to the right; with a left cerebellar lesion, the left arm deviates to the left. This, however, is not by any means invariable in cerebellar abscess, for the cortical centers often escape injury. When present it is a valuable focal symptom.



*Corroboratory tests:* If we stimulate either static labyrinth of a normal person, we invariably produce nystagmus. For example, if we rotate him rapidly to the left or irrigate his left ear with cold water, there invariably results a nystagmus with quick eye movements to the right. If, while this nystagmus lasts, we test his pointing accuracy in the vertical plane (i. e., ability with eyes closed to move the arms correctly in the vertical plane), we shall find that both arms deviate to the left, that is to say, *in the direction of the slow component of the nystagmus*. This is the invariable normal reaction.

*Loss of normal vestibular reaction resulting from cerebellar disease:* Let us suppose a case of right cerebellar abscess in which our tests have shown spontaneous deviation of right arm outward, i. e., to the right, the left arm pointing normally. This *per se* is important evidence of injury to the center for inward tonus upon the shoulder joint. If we irrigate the left ear with cold water or rotate the patient to the left, we shall induce the usual nystagmus to the right. With a cerebellar lesion causing spontaneous outward deviation of the right arm, however, only the left arm responds normally to the vestibular excitation and deviates to the left, the right arm pointing as before to the right, or at least not being drawn to the left.

EPITOME: RULE. CEREBELLAR ABSCESS WITH INJURY TO CORTICAL CENTER FOR INWARD TONUS UPON SHOULDER JOINT CAUSES SPONTANEOUS OUTWARD DEVIATION AND LOSS OF NORMAL REACTION TO VESTIBULAR IRRITATION IN THE ARM CORRESPONDING TO THE CEREBELLAR LESION.

Theoretically, analogous tests may be applied to other joints, e. g., hip, knee, ankle, neck, etc., and possibly functional changes in one or more of these joints may co-exist with similar changes in the wrist and shoulder. Practically, however, and as a matter of actual fact, no single case has been reported in which a diagnosis was, or could have been, based upon the spontaneous deviation and changes in response to vestibular irritation confined to any joint or joints of the body other than the shoulder or wrist. Possible changes confined to other joints are of theoretic interest, and possibly their value in the localization of obscure tumors may later be established. But for practical diagnosis of cerebellar abscess, when tests of shoulder and wrist show these joints to be functionally normal, the further testing of other joints will be found to be of negligible importance.

58 West Fifty-sixth Street.

## SPONTANEOUS RECOVERY IN CEREBRO-SPINAL MENINGITIS OF OTITIC ORIGIN. REPORT OF A CASE.\*

DR. SAMUEL McCULLAGH, New York.

Recovery from diffuse purulent meningitis is of such rarity that each case is worthy of report so that a mass of evidence may be accumulated for study. Thus, in time, it may be possible to winnow out non-essentials in treatment and establish a rational therapy. Prior to 1901, only three authors had reported recoveries from this dread complication. Since that time many case reports have appeared and an extensive literature has sprung up. The most superficial examination of this material immediately reveals an inaccuracy of classification or diagnosis and the number of cured cases will be greatly reduced if cases of meningism and serous meningitis be excluded. Dench<sup>1</sup> in 1909 collected 101 cases from the literature, of which 56 had died and 45 recovered. Of the recovered cases 34 were serous meningitis, 4 circumscribed purulent with serous meningitis, 4 circumscribed purulent meningitis, and but 3 cases of diffuse purulent meningitis. Haymann<sup>2</sup> in a *Sammelreferat* in 1910 reported upon 34 cured cases, of which 12 were of the diffuse purulent type. In personal experience Day, of this society, is *facile princeps*. Prior to the spring of 1913 he had operated upon 61 cases with 4 recoveries, and a possible fifth, though repeated lumbar punctures in this case gave dry taps and, hence, the diagnosis was not established. The careful clinical studies of these cases which he has presented to this society have added to our knowledge of the subject and give his opinions, from which the writer will freely quote, the weight of authority.

Though for diagnostic purposes meningeal involvement of every kind must be recognized, of particular interest to the otologist are three types: (1) Meningism, (2) Serous meningitis, and (3) Purulent meningitis, which may be localized or diffuse, the latter having two forms, the fulminating and progressive. The clinical picture presented by all these types may be of such similarity that a diagnosis made without study of the cerebro-spinal fluid cannot be considered accurate or positive and differentiation must rest solely upon laboratory findings.

\*Read before the American Laryngological, Rhinological and Otological Society, at White Sulphur Springs, W. Va., May 5-6, 1916.

That there may be no present confusion of terms the writer's conception of the definition of the types of meningeal involvement mentioned is here very briefly given in terms of cerebro-spinal fluid findings.

In meningism the cerebro-spinal fluid is clear and sterile. There are no cytological changes. Meningism is defined by Jackson<sup>2</sup> as "a morbid state characterized by a meningitic syndrome without intracranial inflammation." He differentiates the toxemic, irritative and reflex types.

In serous meningitis, in addition to chemical changes, the fluid may be cloudy or clear but always contains leucocytes. The degree of cloudiness will depend upon the leucocyte content. The leucocytes present in this condition have clear outlines, the nuclei are distinct and the normal staining reactions are preserved. In rare instances bacteria will be found, which, however, are not autochthonous but have escaped into the cerebro-spinal fluid when a bacteremia is present, or from some focus in the brain. They have lost their vitality and no growth occurs when their culture is attempted.

In diffuse purulent meningitis leucocytes and bacteria are always present. The leucocytes in these cases are true pus cells, the outlines being irregular, the nuclei indistinct and the normal staining reaction lost. The bacteria present always show growth upon suitable culture media. While meningitis may be caused by staphylococci, cases in which the staphylococcus is reported as the causative organism are under the suspicion that contamination from the skin in making the puncture has occurred, unless repeated punctures constantly show this organism.

The classification of serous meningitis as a true meningitis does not seem firmly established beyond contradiction. Boenninghaus<sup>4</sup> regards it as an antecedent stage of an acute purulent condition, just as an acute catarrhal otitis media may be the antecedent stage of an acute purulent condition. Koerner quoted by Kopetzky<sup>5</sup>, says: "Without doubt we are dealing with a very early stage—initial stage of a purulent leptomeningitis." Kopetzky<sup>6</sup>, reviewing the subject, says: "The conclusion is justified—even in the absence of direct evidence to support it—that in meningitis we are dealing with a disease whose nature is progressive which may terminate in recovery in its initial stage." As direct evidence against this view Day<sup>7</sup>, in reporting upon 53 cases of otitic meningitis, makes the statement that in none of the fatal cases in which the fluid was examined did he find that this (serous meningitis) occurred.

That cases falling within the definition given by Jackson of meningism may present the laboratory picture of a serous meningitis is well illustrated by a case reported by Moussaud and Weissenbach<sup>8</sup>, in which the cerebro-spinal fluid became puriform following the injection of typhoid prophylactic, recovery promptly following the diagnostic lumbar puncture. The presence of leucocytes in meningism may be due to an intense toxemia or to the abnormal response of the individual to a moderate toxemia. It is recognized that those with an unstable nervous system are more prone to meningism. Koerner (ibid.) in speaking of the propagation of organisms of low virulence in the subarachnoid space says, "the toxic substances produced by their growth, acting as irritants, cause an increase in the leucocytes in the cerebro-spinal fluid." Admitting that this occurs in the initial stage of a purulent meningitis, Moussaud's case proves that the leucocytes may be increased in the cerebro-spinal fluid without the presence of organisms intracranially, the irritating toxic substances being carried by the blood or lymph stream. In this indirect manner is it possible, also, that the changes in the cerebro-spinal fluid in localized meningitis may be induced.

Under serous meningitis have been included cases which show a non-reproductive organism in the cerebro-spinal fluid. Is it not possible that the vitality of the organisms recovered in the cured cases of diffuse meningitis may have been so low that, though growth occurred when planted upon suitable media in a favorable environment, yet in the relatively unfavorable environment of the cerebro-spinal fluid, they were practically incapable of multiplication and hence relatively impotent?

In view of the termination of the case to be reported, if it be admitted as one of diffuse purulent meningitis, the possibility of self-limitation in an advanced stage must be considered and the suspicion is born that the cases that have recovered may have done so in spite of, rather than on account of, some of the operative measures that have been undertaken for their relief. Day<sup>9</sup>, although credited with four recoveries, said, "he did not believe there is any known agent or method which will cure an active meningitis." Whiting<sup>10</sup> does not believe that any case of diffuse purulent meningitis ever recovers.

In the literature the following cases, of otitic origin, have been found in which recovery has taken place, although bacteria capable of growth were present in the cerebro-spinal fluid. The search has been fairly exhaustive:

AUTHOR	JOURNAL	ORGANISM PRESENT
Held and Kopetzky	Collected by Haymann, Alexander Mygind Mygind Mygind Willmack Alexander Alexander Urbantschitsch Holmgren Sheppard Stacke	Gram neg. diplococci. Rod-like strep.
Alexander		Streptococcus
Mygind		Streptococcus
Mygind		"Bacteria"
Mygind		Rod-like bacteria
Willmack		Diplococci
Alexander		Cocci in chains and groups
Alexander		Gram pos. cocci in chains
Urbantschitsch		Gram pos. cocci
Holmgren		Diplococci
Sheppard		Streptococcus Mucosus Caps.
Stacke		Diplococcus Lanceolatus
Gradenigo	Collected by Schultze (Clinic of Hale) (Clinic of Hale) Sokolowsky Hautant Laurens	Staphylococcus (recovered twice)
Schultze		Diplococcus
(Clinic of Hale)		Streptococcus
(Clinic of Hale)		Staphylococcus (recovered twice)
Sokolowsky		Streptococcus
Hautant	Collected by Laurens	Diplococci and cocci in chains
Laurens		
Day	Surg., Gyn. and Ob., April, 1913	Streptococcus
Day	April, 1913	Streptococcus
Day	April, 1913	Streptococcus
Day	April, 1913	Influenza
Coulet	17th Int. Cong. Med., London, 1913	Gram pos. Diplococcus
Bryant	Tr. A. L. R. O., 1914	Cocci in pairs and chains
McKenzie	Proc. Royal Med. Soc., London, 1914-15, v. 83	Streptococcus
Scott (3 cases)	Discussion of Coulet's Case	"Bacteriologically proved"
Syme	Discussion of Coulet's Case	
Friesner	Trans. Sec. of Otolaryngology, N. Y. A. M., Oct., 1915	Streptococcus
Lynah	Trans. Sec. of Otolaryngology, N. Y. A. M., Nov., 1915	Friedlander's bacillus

Of this total of 31 cases, the 12 collected by Haymann and the 6 by Blanluet were not traced to their original source. It may be that some of the cases included by Haymann did not show growth from the organisms recovered from the cerebro-spinal fluid.

Three cases mentioned by Scott in a discussion as "bacteriologically proved" are included. The case reported here is not included, nor are the cases to be reported by Crockett.

The bacteriological history in some cases is very much lacking in detail. The findings may be grouped as follows:



- 11 Streptococcus, including one mucosus capsulatus.
  - 1 Influenza bacillus.
  - 1 Friedlander's bacillus.
  - 1 Diplococcus lanceolatus.
  - 2 Staphylococcus, recovered twice in each case.
- 10 Cocci, not accurately described.
  - 2 "Bacteria."
  - 3 "Bacteriologically proved," but organism not named.

The following case is presented for your consideration with a full recognition of the lack of detail in the history and due apology therefor. The case was seen by the writer in conjunction with Dr. Max Feldman, whose patient she was.

I. P., female, 18 years old, was admitted to the Beth David Hospital on April 28, 1914, with the following history. A submucous resection of the septum had been performed four days previously. Both sides had been packed. Sore throat followed and later pain developed in both ears, which was her chief complaint on admission. The temperature was 101.8° F. The next day a double paracentesis was performed and hot irrigations ordered. The temperature ranged between 101° and 103°, and the symptoms of mastoiditis showing no abatement, on May 1 a double mastoidectomy was performed. The dura in the region of the roof of the left antrum was penetrated by the sharp edge of a piece of bone broken off by a curette. The site of this tear was carefully cleansed with alcohol, the wound enlarged slightly and a small rubber tissue drain inserted. The patient did not react well from the operation, being delirious the night following the operation and semi-comatose the next day. The temperature varied from about 102° to 105° for the five days following the operation. On May 7 a lumbar puncture, made by Dr. A. Braun, gave a clear fluid which, on centrifuging, showed many capsulated streptococci. No bacteriological facilities being available, no culture was made. The temperature which seemed falling by lysis at this time reached normal the next day and never went above 100° during the remainder of her stay in the hospital, in spite of the progress of meningeal symptoms. The patient had all the classical symptoms of a diffuse meningitis including stiffness of the neck, Kernig's and Babinski's signs, extreme restlessness necessitating restraint, involuntary urination and defecation, etc. In addition there was nystagmus to the right, facial paresis, paresis of the right side beginning in the leg and extending to the arm, and aphasia.

The writer regrets that the history of this case was so carelessly kept that it is impossible to present the time of occurrence of these symptoms in an orderly manner and only the bare facts herein recorded can be given, supplemented in a slight degree by his remembrance of the case as corroborated by those associated with him in its treatment.

At the time the lumbar puncture was made and the presence of what was thought to be *streptococcus mucosus capsulatus* in the cerebro-spinal fluid established, it was felt that no further operative interference was justified. Urotropin was ordered in twenty grain doses. Three days after the lumbar puncture the patient's condition began to improve and she went on to perfect recovery, all traces of the meningeal involvement disappearing. She was discharged from the hospital on May 26, about one month after admission. Since her discharge she has remained well, has married and borne a child.

This case appears to have been one of diffuse purulent meningitis of a slowly progressive type with spontaneous recovery. However, it is not possible to pass upon the question positively as it may have been a localized condition with non-viable organisms in the cerebro-spinal fluid.

A study of the treatment of the cases cited above leads only to negative conclusions. All writers lay emphasis on the necessity for the thorough eradication of any focus of infection in the temporal bone but as this step is usually demanded before meningeal involvement has developed it must be classed as prophylactic, rather than a curative measure.

Of the operative measures dural drainage has been successful in three cases in the hands of Day, yet in view of his postmortem studies of the area drained in his unsuccessful cases, he is very pessimistic, as already noted, as to the curative results thereof. Crockett will report two cases cured by this method.

Day did regard drainage of the cisterna magna as affording more promise. Though theoretically promising, the practical results have not been brilliant. Kopetzky<sup>11</sup>, who was associated with Haynes in some of his work, says: "Critical study of the cases operated on presents the basis for the opinion that meningitis is not simply a surgical problem to be solved by finding a safe method by which to eliminate the pus accumulation and to establish intra-cranial decompression."

Increased intra-cranial pressure and toxemia are the conditions that must be combated. Lumbar puncture is of great use in con-

trolling this pressure and is probably of some value against toxemia by removing some part of the toxins already formed and promoting the secretion of fresh cerebro-spinal fluid which has some bactericidal action. Mygind<sup>12</sup>, who has operated upon about 50 cases, mostly serous meningitis, with about 20 per cent of recoveries, voices practically the only dissenting opinion among those who have written upon this subject when he says: "I am very doubtful whether lumbar puncture is of much therapeutic value in this disease."

As to drugs, a case of Hautant's recovered after the use of collargol and electrargol intra-spinously, and Laurens' case recovered after collargol alone. Bellotti<sup>13</sup> reports the cure of two cases of acute cerebro-spinal meningitis by the use of phenol hypodermically used, as a last resort.

Unfortunately, "some barrier prevents most medicaments from reaching the cerebro-spinal fluid by way of the blood stream." Myers<sup>14</sup> used urotropin in large doses but was never able to find a trace of formaldehyde in the spinal fluid.

Two cases are included in the list enumerated in which sera and vaccines were used. Dwyer<sup>15</sup> reported a case of diffuse meningitis due to streptococcus hemolyticus, not of otitic origin, however, which recovered under lumbar puncture, serum and vaccine. The effect of Flexner's serum in the epidemic form has been revolutionary.

The briefest consideration of the physiological importance and anatomical complexity of the central nervous system and its membranes would, a priori, tend to the acceptance of the view that surgical interference offers no hope of cure, per se. The relief of pressure does remove factors of danger and prolong life, so that curative measures are given a longer time to exert their beneficial influence. Drugs being practically useless it would seem that our hope for improvement in the mortality of this disease lies in development along the line of serum or vaccine therapy as a curative agent, our control of intra-cranial pressure by lumbar puncture being an adjuvant of marked value.

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- 108 W. Fifty-eighth Street.

#### **Injury to the Internal Ear Presenting Some Unusual Features.**

CAPTAIN H. LAWSON WHALE, *British Med. Jour.*, April 22, 1916.

Bullet wound of head, left frontal; no exit; no bullet with x-ray; fragments removed; no base fracture. Evidence of cerebral irritation like sulkiness, mischievousness, etc., for some days, disappearing on escape of fluid from left ear which was clear, and reduced Fehling's solution. Right ear was normal, center of left ear canal sensitive, stony hard swelling from roof resembling exostosis, drum could not be seen. Hearing equally good on both sides, the right remaining good but the left becoming progressively worse from speech 18 feet, and whisper 4 inches, to nil in five weeks; Weber to right; b. c., 15 seconds on left after four weeks, but nil later on. Upon assuming sitting position in bed, fell to left side but in few days could sit up and walk unsteadily, later he walked straight with eyes open but with eyes shut staggered to the left; crab-like gait crossing right foot over left on walking. Later gait was normal with eyes opened or closed. No asthenia dysdiadokokinesia, giddiness, vomiting or nausea, no lumbar puncture or examination of optic discs. Eyes to right horizontal nystagmus first degree at first which later disappeared, eyes to left no nystagmus. Caloric test increased right nystagmus but never any to left. Right nystagmus could be inhibited by warm irrigations of left ear. On his discharge, patient had on right side normal hearing, normal caloric reaction, left side, total loss of labyrinthine reaction and complete deafness. Gait and health normal.

STEIN.

**TUBERCULAR MASTOIDITIS WITH SEQUELLAE: MULTIPLE  
OPERATION: COMPLETE RECOVERY.\***

DR. WILLIAM LEDLIE CULBERT, New York.

Clinical observations have shown that careful routine examinations of suppurating middle ears and suspicious mastoid wounds for tubercle bacilli demonstrates the presence of these bacilli with surprisingly increasing frequency.

Brieger, in his exhaustive article on "Middle Ear Tuberculosis," published in the Transactions of the German Otological Society, Vols. 9-10, March, 1913, states that "the appearances of middle ear tuberculosis,—in spite of the many characteristic pictures presented,—are not typical enough to make possible by themselves a dependable diagnosis." But given a clinical picture, either in the middle ear or in the operated mastoid which suggests a tubercular condition, if the region is irrigated with a saline solution and this solution then treated according to the method outlined by Drs. Cocks and Dwyer, the presence or absence of the tubercle bacilli can be positively demonstrated and the diagnosis established beyond a doubt.

As a fairly complete illustration of the healing of a decidedly tuberculous process involving the entire structure of the ear, I have selected a case to report to you which I have had under constant treatment and observation for something over two years.

M. M., a female patient, seven months of age, of Irish parentage, was referred to me by Dr. W. B. Coley, March 22, 1914, with a history of having had a discharge from the right ear for six weeks, following an apparently slight cold. During these six weeks she had been running a temperature and evidently suffering considerable pain, as she was very fretful and wakeful at night.

The mother stated that during the last three or four weeks she had noticed that the child had been unable to close the right eye, evidently a beginning facial paralysis.

Both parents were healthy and well and there was no tuberculosis in either of their families. The child's three older brothers and sisters were all perfectly well. The patient had always been a strong, healthy baby until she had the cold which resulted in the middle ear abscess and mastoid.

The child was very much emaciated, and had a temperature of 101°, pulse 144, respiration 24. Chest and abdomen negative. Ex-



amination of the ears showed the left ear normal; right ear, o. m. p. a., with a complete sagging of the external canal wall. There was a purulent discharge, but inadequate drainage. The mastoid was tender all over, and the tissues around the external ear were infiltrated, producing a diffuse furuncular condition. In addition, there was a profuse purulent nasal discharge.

The child was sent to the hospital at once and was operated upon the same day, the usual simple mastoid operation being performed. The mastoid process was completely involved. The mastoid cells (which were quite fully developed) were thoroughly cleaned out. The external canal wall was incised anteriorly, posteriorly, and below to give a thoroughly free drainage.

For the next few days, the outer dressing and the packing of the external canal were changed daily, a wet dressing being applied. The condition seemed to progress fairly favorably, the temperature ranging from normal to  $102^{\circ}$ , the pulse varying from 120 to 144. None of the stitches held, however, but all sloughed through. In other words, there was no healing process between the surfaces and the wound gaped wide open. However, the child slept better and took its nourishment better, and was discharged from the hospital on the eighth day, being thereafter brought in daily for dressings.

The wound did not granulate, but assumed an unhealthy grayish appearance. The von Pirquet test was then made, and gave a strongly positive reaction. At the same time, the mastoid and external canal were washed out with normal salt solution, which was sent to the laboratory and treated according to the method described by Drs. Cocks and Dwyer, and numerous tubercle bacilli were found.

It was then decided to give the child tuberculin, and she received one minim of a 1-1,000,000 dilution, beginning on April 8. From then on she received regularly two injections a week, increasing each dose by one minim, up to ten minims. This was continued for several weeks. Then a dilution of 1-100,000 was started, and a dose of one minim given in the same way, this dosage also being increased regularly until ten minims were reached. This ten minim dosage was again held for a while. Then a dilution of 1-10,000 was started and continued in the same way. The tuberculin treatment was continued regularly for a year.

To revert to the local condition. In spite of arduous and daily dressings the furunculosis continued. The infection was most vir-

ulent. There was a foul smelling discharge from both the external canal and the mastoid wound; but in spite of this the facial paralysis which had been noted before the operation cleared up and the child seemed to be gaining in general strength.

However, five weeks after the operation the infection from the discharge from the middle ear and furuncle invaded the parotid gland, forming a large abscess, and the child again developed a facial paralysis on the right side, this time more marked.

On May 20, 1914, the child was again sent to the hospital and the parotid abscess was opened. A small incision was made just in front of the tragus and a considerable amount of thick pus was evacuated. A grooved director passed down evidently entered the substance of the parotid gland, and with a curette all the necrotic tissue was removed. A counter opening was made into the external auditory canal, and the whole wound was packed with gauze wet with a one per cent formalin solution and a wet dressing was applied. At the same time the unhealthy granulations in the mastoid wound were curetted.

The child's temperature, which had been 102.2°, immediately began to fall, reaching normal on the third day, at which time she left the hospital.

The aggregate amount of foul smelling pus that came from the child's various wounds was almost inconceivable, and yet she continued to gain in weight and improve in general appearance.

The upper cervical lymph glands of the right side became involved and finally broke down into a large fluctuating mass a little below the mastoid wound.

On July 16, 1914, the child was again sent to the hospital, for the third time, and this mass of suppurating glands was dissected out.

The tuberculin treatment was continued, as already stated, throughout the entire summer and winter of 1914-15, until the end of March. Then, as the purulent discharge from the middle ear still continued, a culture was made from the pus. *Streptococcus haemolyticus* was found and an autogenous vaccine prepared. She was given injections of this autogenous vaccine through April and May, 1915.

The discharge from the various wounds diminished gradually and finally ceased, and the mastoid wound healed. The purulent nasal secretions also ceased. During this time the child gained steadily in health and strength,—indeed, became quite robust.

On July 14, 1915, she was again brought to me after having been away for several weeks. Her mother reported that she had been awake all the previous night with pain, again in her right ear. Her temperature was then 105.2°, pulse 137, respiration 44. There was a swelling behind the ear in the old cicatrix, which was tender and fluctuating. There was also a discharge from the ear, which had commenced suddenly.

She was immediately sent to the hospital and prepared for a radical mastoid operation. The usual incision was made through the old cicatrix and the soft parts were separated. There was pus and granulation tissue deep in the wound, and when the writer commenced to ream out the unhealthy bone around the aditus it was noted that the entire posterior bony canal wall seemed to move. Further dissection revealed the fact that nature had separated the whole skeleton of the mastoid process together with all the posterior canal wall, thereby practically performing a radical mastoid operation. This entire large sequestrum was removed *en masse* and sent to the laboratory for examination. Such unhealthy bony tissue as surrounded the sequestrum was curetted away, especially over and around the temporo-sphenoidal lobe, where quite a large area of the dura was exposed, as was also a considerable part of the lateral sinus.

The usual flaps were cut, and the posterior incision was sewed up except for a small drain at the lower extremity, and the wound was packed in the usual manner through the auditory canal.

The child's temperature immediately dropped to normal. The next day it rose to 104.4°, and gradually came down, not going again above 102° on the second day, when it reached normal and so remained.

On account of the large area of exposed dura and the previous tubercular condition, it was feared that possibly a meningitis might develop, but no signs of this appeared at any time. Furthermore, all the stitches in the cicatrix held splendidly and the skin remained perfectly healthy in appearance. When the drain was removed from the bottom of the mastoid wound another washing with saline solution was run in the external canal and out through the small opening at the lower extremity of the wound. This was also examined in the laboratory for tubercle bacilli, but none were found. The child made an excellent convalescence, and was able to leave the hospital on July 28, 1915, two weeks after the operation, returning daily thereafter for dressings of the radical mastoid, which proceeded to heal, normally and healthily, in the usual time.

Since then the mother has brought the child in regularly every month. The little patient has remained perfectly well and strong, and has gained greatly in weight until when I saw her last on May 2, she presented the appearance of an unusually healthy and normal child. She has not had a single cold all winter.

Since the healing of the radical mastoid last August, there has been no discharge from the ear, which is dry and healthy. The facial paralysis still exists, but is gradually diminishing, and the child can now partially close the lids of the right eye.

*Pathological report by Dr. J. G. Dwyer:* The sequestrum includes a skeleton of all the mastoid process down to the external semicircular canal. Histological examination of the sequestrum shows typical tuberculosis of the bone.

16 East Fifty-fourth Street.

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**Nasal Affections and Deafness.** SYME, W. S. (Glasgow), *Glasgow Medical Journal*, March, 1916.

The writer lays stress on the great influence of nasal and naso-pharyngeal affections in the causation of deafness. Among other naso-pharyngeal conditions which lead to tympanic and Eustachian catarrh, he attaches considerable importance to irritation caused by excessive cigarette smoking. In reference to the nasal passages proper, posterior turbinal hypertrophy is the most frequent cause of ear trouble, being in this respect second only to adenoids. Indications for nasal treatment in cases of middle-ear deafness associated with anterior turbinal enlargements, and septal deformities are less clear, but improvement of the hearing not infrequently follows operative treatment of these conditions, especially when the deafness is of moderate degree, the tympanic membrane remains freely movable, and inflation by the catheter leads to decided increase of the hearing. Cases of inner-ear deafness, and of otosclerosis not associated with adhesive tympanic changes must, of course, be rigorously excluded. The question cannot be decided by the result of a single experimental inflation. Even when the latter leads to no change in the hearing, a gradual improvement does take place in some cases after nasal treatment. It is important also to bear in mind the possible baneful effect on the middle-ears of nasal suppuration and especially of accessory sinus disease. GUTHRIE.

## DISEASE AND SURGERY OF THE FIFTH NERVE.

DR. JOHN F. BARNHILL, Indianapolis.

Patients suffering from facial pain are frequent visitors to the otolaryngologist. Mild and medium degrees of the fifth nerve involvement are common, and severe types are not rare. To ascertain the cause of these facial aches and pains, to eliminate that cause and thus cure the painful affection is a daily problem. Very often these ailments are diagnosed "only a neuralgia," just as though that were an invariable, definite, disease for which a specific anti-neuralgic drug is always available. Such simplicity in dealing with this troublesome affection no longer satisfies medical thought. Hence scientific investigation of this, as of many other subjects in medicine and surgery that were formerly passed over lightly is demanded, and more searching methods of examination have shown that the term neuralgia in its former generally accepted meaning was much abused; also that the neuralgias, like most other diseases, are caused by pathologic changes that may be discovered, if only sufficient energy and the known existing aids to diagnosis be employed.

I need only to remind you that the trifacial nerve supplies with sensation nearly all the structures with which the otolaryngologist deals. The nerve may, therefore, aptly be termed the special sensory nerve of the otolaryngologist, for with it this specialist must deal in some measure in many of his patients. Treatment of a surgical nature, either of the exterior of the head, or of its interior cavities, brings the operator into immediate relation with some branch of the trigeminus, which supplies the envelopes of the brain, the accessory nasal sinuses, the whole nasal interior, the jaws, teeth, tonsils, palate and orbits; on the exterior it supplies the nose, face, forehead and ear. Besides this sensory distribution the branches of the fifth nerve supply the anterior two-thirds of the tongue with special taste, while the powerful muscles of mastication are innervated by branches from its motor root. This nerve with its ganglia and communicating branches from other nerves and ganglia, when diseased, furnishes a difficult field of study, because of the great depth within the soft and osseous structures of the head at which these ganglia and connecting nerve branches are situated. The problems presented by affections of the trigeminus are, therefore, often obscure to such an extent that a solution may be reached only when, first, a definite knowledge of the anatomy of the whole head is before the investigator; second, when the nasal interior and

all its accessory sinuses have been inspected by accurate methods; and third, when the surgeon may call to his aid the service of the oculist, roentgenologist, internist, dentist, neurologist, pathologist, bacteriologist and serologist. Of course, not all cases of disease of the fifth nerve will require the services of such a large number of specialists, but the worst cases may demand all before a positive conclusion is possible.

Affections of the fifth nerve may vary in severity from nagging little pains, either constant or intermittent, up to pain so severe and constant as to be unbearable. The term neuralgia is commonly used to designate all varieties of the disease, while those more careful in the use of terms employ neuralgia, neuritis and *tic douloureux*. In reference books and essays on the subject I find much confusion in the meaning of the terms used, but the best classification would seem to be one in which the term neuralgia is used to designate a pain where no pathological reason is discoverable; neuritis when the nerve trunk is inflamed, the *tic douloureux* where the sole pathology is in the Gasserian ganglion. Since many cases of so-called neuralgia are clearly caused by infection it would seem better were the term infective neuritis used in all such. Many local and general derangements have been assigned as the cause of facial neuralgia. It is probably never a primary disease although there are cases in which no pathology of any kind can be found. Among proven causes may be mentioned (a) the general infectious diseases including typhoid, malaria and syphilis. The latter disease may act in two ways to produce neuralgia: First, infection of the nerve itself, and second, pressure on some nerve trunk from a nearby gumma. (b) Extra-neural pressure from any cause, as from a tumor, an osseous growth springing from the wall of the neural foramen, from traumatic or other infiltrates in or near the nerve trunk. (c) Infection of the nerve itself. This is no doubt the most common cause and in facial neuralgias, perhaps, is a more frequent cause than all others put together. According to Behans, the toxic cause may arise from tonsillitis, influenza, malaria, gout, rheumatism, gonorrhoea, or, indeed, from any general infection. This author states that the toxic material circulating in the blood lodges inside the nerve sheath where it sets up a true neuritis. In addition to the sources given above by Behans as a cause for nerve infection, others should undoubtedly be more specifically stated, namely, suppuration of the nasal accessory sinuses, purulent infections at the roots of the teeth, and pyorrhoea alveolaris. The frequency with which suppurative disease of the sinuses, teeth and gums, taken together with the fact that the branches of the fifth



nerve which supply the several sinuses, teeth and mouth, are intimately exposed to these large suppurative areas, would point strongly to the almost inevitable infection of the nerve endings in all such cases. Clinical evidence on this point bears out the preceding supposition, for it is undoubtedly true that some form of neuralgia is a frequent complication of both sinusitis and pyorrhoea. A suppurating accessory sinus may also cause neuralgia because of pressure from pent-up fluids, especially in acute sinusitis, and in chronic cases from the enormous thickening of the lining membrane which results, and which both pinches and causes infection of the nerve terminals.

Brophy in his new work on oral surgery states that the most common cause of trifacial neuralgia lies in disease of the teeth. This author was trained as a dentist and has been a leader in dental thought; therefore his statement may be regarded as authority from the dental standpoint. The chief sources of neuralgia emanating from the teeth are, according to Brophy, unerupted teeth, malposition, injuries during extraction, dental tumors, exposed nerves in the pulp, unskillfully placed fillings and pyorrhoea.

A thorough search for the cause of a given case of neuralgia is entirely essential, since it is scarcely probable that either medical or surgical means of cure will be worth while until the cause is known. The examination in all cases should include the most thorough investigation of the tonsils, adenoid, teeth, gums, mouth, nose, eyes, and all the nasal accessory sinuses. If a satisfactory cause is not found in any of these, and suspicion rests upon the sinuses or teeth, x-ray plates should be obtained. I have in several instances been surprised and gratified on finding that the x-ray plate showed an unerupted tooth, or a thickened mucosa in one or more sinuses which discharged only small amounts at intervals and was on that account overlooked. A perforated nasal septum, or a swelling of the septum may point strongly to lues, and this suspicion may be further borne out by finding healed scars or open ulcers in the throat or mouth. If uncertain a Wassermann test may give the information most wanted. Other blood tests may be necessary in malarial districts. The three points of examination, namely, the sinuses and foci of infections about the nose and mouth, x-ray examinations and blood tests, have done much to eliminate the mystery as to the cause of neuralgia and to place it among diseases whose cause is known.

Nearly every writer I have consulted on the subject of neuralgia mentions anemia as a prominent cause. I have observed anemia in many of my cases, but do not think it the cause of the neuralgia,

for in nearly every such case there has been found a focus of suppuration which fully accounted for the anemic state, especially when considered in its relation to the facts that the patient frequently swallows considerable quantities of pus, that the pain disturbs the patient's sleep and that nutritional disturbances would inevitably result.

To name the drugs that have been recommended for the cure of facial neuralgia would be to include all in the *materia medica*, and many besides. But I desire to deal chiefly with the surgical side. Efficient surgical treatment of neuralgia of the fifth nerve may include the surgical treatment of any part of the head, but especially of the dura mater, the nose, the nasal accessory sinuses, the nasal interior, the tonsils, palate, teeth, nasopharynx and eyes. In other words, any of the structures supplied by this nerve. Surgical treatment should not be applied to any branch of the nerve itself in any case in which the cause of the disease can be made out, until the cause, when of a surgical nature, has received surgical care. As an example, should sphenoiditis be found in conjunction with neuralgia of the second division it would be faulty surgical practice to resect the nerve before eradicating, in so far as possible, the disease within the sinus. I have seen cases which had been treated by partial nerve extraction when there was present, as a most probable cause of the neuralgia, a chronic suppurative disease of one or more sinuses. Certain neuralgias persist, however, even after every nasal sinus or other suppurative cause has been surgically eradicated, and in such cases destruction of the function of the nerve trunk or of the Gasserian ganglion must be considered. When the probable causes have been removed in so far as possible, but without relief, surgery of the nerve trunk or of the Gasserian ganglion is necessary.

The chief measures employed at present are, first, the injection into the nerve trunk or its ganglion of origin of some substance that more or less permanently destroys the nerve and blocks sensation; and second, destruction of a portion of the nerve trunk and third, removal of or destruction of the sensory root of the ganglion. All these plans are advocated and all have a recognized value. The selection of one or the other plan must depend largely upon the individual to be treated. The injection of alcohol or osmic acid into the nerve trunk or ganglion should be given preference in the young, in the earlier stages of any neuralgia, in those advanced in years, and especially in those in whom a general anesthetic is contraindicated by atheroma, kidney or other lesions. Patrick, Camp and Hartel are representative advocates

of the alcohol injection plan. Patrick's experience with this method may be taken as typical of our present knowledge of the technic and value of this method. This writer (*Journal A. M. A.*, Jan. 20, 1912) states that the injection of the nerve trunks with alcohol is easy, effective, not painful, not dangerous and that the cure resulting lasts from six months to four years. No anesthetic is used, and the injection may be given in the office, or home of the patient. Stiffness of the jaw, puffiness of the eyelids, ecchymoses, closure of the eye from swelling and other inconveniences may result. Alcohol injection must not be regarded as a cure, for, as Patrick points out, "No procedure is a cure except the removal of the sensory portion of the Gasserian ganglion."

The point of injection of the alcohol should be either the Gasserian ganglion or the foramina of exit of the first and second divisions of the nerve from the skull. The first division of the nerve is best injected at the supra-orbital notch. Although writers in general usually state that these injections are easily made, no one, in so far as I am aware, claims to make perfect injections in all cases. Patrick in 500 injected cases gives the following frank statement as to success and failure from the procedure: "Injections of the infraorbital branch, twenty-five per cent failures, forty-two per cent partial failures and thirty-three per cent successes. Injections of the third branch were twenty-seven per cent misses, forty-five per cent partial success and twenty-eight per cent wholly successful." More than one injection was required in many of the cases. Many of the injected cases must be treated later by the more radical nerve operations. Most of the cases on which I have operated personally for resection of the nerve trunks had been injected previously either by myself or others, and some of the injections had been made by operators of the widest experience, only to have the pain return in all its former severity a few weeks later. I shall give no description of the technic of nerve trunk injection for the reason that this can be learned only on the skull and cadaver; moreover, excellent technic has already been described. I can agree fully with writers who state that the injection is easy, painless and safe, but I cannot agree with those who say it is easy to penetrate a given foramen or to inject the nerve trunk itself, because such has not been my experience. The anatomic build of skulls is so very different, and the amount of soft structures overlying the skull so varying that each case requires a somewhat different manipulation in order to reach the desired spot, and sometimes success in actually doing so requires more than one effort.

Injections of alcohol and carbolic acid into Meckel's ganglion have been made by Sluder and others following the publication of his several papers on the relation of the sphenopalatine ganglion to the nose, in the transactions of the American Laryngological Association, 1909, and subsequently. Dr. Sluder has shown more conclusively than any other investigator the intimate anatomic relationship between the posterior ethmoidal and sphenoidal sinuses and the sphenopalatine ganglion and its branches. I have recently made several dissections of the sphenomaxillary fossa on the cadaver, and have thereby confirmed Sluder's deductions concerning close proximity of Meckel's ganglion to the posterior ethmoidal cells and sphenoidal cavity and therefore the probability of toxic involvement of this ganglion and its branches in any case of post-ethmoidal or sphenoidal suppuration in which the relationship of the sinus and nerve structure is intimate. I have not been able so far, however, to obtain as good results from the injection of the ganglion as have been reported by Sluder in his several papers. In addition to the value of the method of injection pointed out by Sluder, I believe great assistance may be derived from the plan of injecting the ganglion in cases where the second division of the nerve has been resected for neuralgia, but in whom the resection, for some reason, has not included and destroyed the branches to Meckel's ganglion.

Cases of trigeminal neuralgia that persist after the removal of all known causes, and that continue or return after one or more alcohol injections of the nerve trunk will require surgery of the Gasserian ganglion or of one or more of the nerve trunks. Many able surgeons have been interested in the surgery of this nerve, among whom are Carnochan, Mears, Rose, Kocher, Cushing, Frazier, Spiller, Hartley, Krause and Keene. Several operative procedures take the name of one or the other of these operators. In general it may be said that in the most recent cases of neuralgia or tic that surgery of the nerve trunks should be performed, while in the cases of long standing, especially of the ascending variety of the nerve affection in which the ganglion itself is the chief seat of the disease, Gasserectomy only would offer hope of cure.

Operations on the nerve trunks may be superficial or at the exit of the nerves from the skull. My own experience with cases which were operated by neurectomy or avulsion of the nerve trunk at any considerable distance from the foramen of exit from the skull has been disappointing. I have seen and operated on the trunks of nerves that had been operated both by myself and others, some who were surgeons of first rank, in which the nerve

had been but superficially avulsed, and which were followed quickly by a return of the former pain. There are two reasons for the return of the pain. First, many investigators have noted the rapid regeneration of nerve trunks following the exsection of even considerable portions. In experiments on the facial nerve of the dog, made by myself in 1912,\* I found that on severing this nerve completely and immediately suturing the severed ends, function was restored in three months, it being found on histologic examination of the nerve trunk at the point of section that regeneration of the nerve was complete. Partial regeneration of the nerve trunk and partial restoration of function occurred after complete severance of the nerve in three months when the severed trunks were merely placed in apposition but not sutured. After a section of the nerve in which 4 mm. were removed entirely some movement of the facial muscles were plainly noticeable after four months. Since sensory nerve trunks regenerate in shorter time than motor nerves it is evident that such trivial operations as mere section of the trunk, or avulsion or exsection of a short portion will do no permanent good. Second, in superficial operations on the nerve trunk all the diseased branches of that trunk are not included. For example, avulsion of the infraorbital nerve at its exit from the infraorbital foramen, or of the mandibular branch at the mental foramen results in the nerve breaking at the margin of the foramen or a short distance within the canal and therefore the nearest branches are usually not disturbed. I have made numerous experiments on the avulsion of these nerves at their superficial foramina on the cadaver and found that it is only occasionally possible in case of the infraorbital nerve to secure the anterior dental branch even though the nerve at the foramen were freely exposed and Thiersch's method of twisting the trunk by means of forceps be carefully employed. Superficial methods are therefore not reliable in the surgery of the trifacial nerve. When the supraorbital division alone is involved avulsion is usually effective if all the branches are included. Avulsion of the supraorbital nerve is much easier and therefore often more successfully performed than on the second and third divisions. The reason, of course, is that the nerve trunk does not traverse any osseous canal, its exposure throughout its course is easy and the avulsion is accordingly more complete. My most troublesome cases have been those in which the supra- and infratrochlear or nasal branches are involved in the neuralgia. These branches are oftenest missed in the operation, and when this unfortunately happens the patient may make as much

\*Proceedings International Otological Society.

complaint of the comparatively localized pain about the inner canthus of the eye and the external half of the nose as he did of the more diffuse neuralgia for which the operation was performed.

From experiments on the cadaver and from personal experience in operated cases on the living, I believe that a modified Rose's method of operation on the second division of the trifacial nerve offers best results. I follow the plan of making the incision over the cheek one centimeter below the orbital margin, dissecting the nerve trunk from the tissues adjacent to the foramen and then ligating with a stout thread that is to be left until the completion of the nerve resection. The periosteum of the lower orbital margin is then incised and the periosteum of the entire lower third of the orbit is lifted back to the sphenomaxillary fissure. The contents of the orbit are lifted upward from the orbital floor sufficiently to expose the course of the infraorbital canal. Killian's angular frontal sinus chisel is used to cut away the upper wall of the infraorbital canal throughout its entire length. The nerve trunk is then lifted from its bed by means of the attached ligature and the dissection is continued until the foramen ovale is reached at a distance of about 45 mm. from the infraorbital foramen. When the nerve trunk has been freed for this distance it is grasped by an artery forceps as deeply as possible and the nerve is twisted away by the Thirsch method. On reaching the spheno-maxillary fissure dense fibrous structures are met which render somewhat difficult the dissection of the nerve which is necessary to the further dissection in the pterygo-maxillary fossa. This dissection is, however, not more difficult than is sometimes encountered in working around a sharp deflection posteriorly in the performance of a submucous resection of the nasal septum, and experience with the latter operation is valuable in the deep nerve work here described.

The operations for the resection of the infraorbital branch recommended by both Kocher and Carnochan involve opening the maxillary sinus and temporary resection of a portion of the malar and maxillary bones. It seems to me that extensive resection of these bones is usually not necessary, and that any operation on the nerve which opens the maxillary antrum is a surgical misfortune. In two of my cases the antrum was opened, one by accidentally penetrating the mucous membrane of the antrum while performing the operation for avulsion of the nerve above described, and the other intentionally while following a modified Kocher method. Both cases ultimately recovered both from the operation and the neuralgia, but the wound in each became infected from the maxillary antrum, the skin sutures broke down, prolonged treatment was necessary,



and more thickening of the cheek with scar tissue resulted than was necessary.

In following any of the plans adopted by surgeons for the treatment of neuralgia of the third division two points must be borne in mind: First, that a very considerable portion of the nerve trunk must be removed from the dental canal in order to be curative for any great length of time, and second, that in making the necessary external incision over the jaw, injury to one or more branches of the facial nerve may result with corresponding facial palsy. The facial nerve is best avoided by a horizontal incision over the site of entrance of the third division of the facial into the dental canal, the same to be carried down to the masseter muscle, the fibers of which are then separated perpendicularly and the jaw bone exposed. A perpendicular groove is chiseled into the bone down to the nerve, following its course for three-fourths inch. This extensive exposure of the nerve trunk enables the operator to loosen the trunk freely, to grasp it firmly in the jaws of the forceps, and to make traction in the direction of the dental canal. I have made experiments on removal of the nerve from its canal in the cadaver and find that a very small section only of the nerve trunk can be withdrawn by any means unless the exposure is of considerable length and the nerve is dissected freely from the canal. The difficulty is due to the fact that the nerve is apparently well imbedded in connective tissue throughout the entire length of the canal, and besides gives off the several dental branches, all of which fasten the nerve quite firmly. Even with free dissection and the use of every precaution in pulling and twisting the nerve from the canal it was found that the break occurred only a little beyond the point where the bone was removed. Owing to this fact, as well as to the further fact that a nerve regenerates very rapidly in an osseous canal, it is necessary to expose the trunk again at its exit from the mental foramen, to chisel away the outer canal wall, and to avulse as much of this portion of the trunk as possible.

I have had no experience on the living with Kronlein's method of resection of the zygomatic process, reflection of the tissues from the underlying fossa and from the foramen rotundum and foramen ovale, whereby both the second and the third division of the fifth nerve may be resected at their exits from the skull, but performance of this operation on the cadaver has given me the feeling that Gasserectomy by the method of Cushing would be quite as easy and possibly as safe, and should therefore in proper cases be the operation of choice.

408 The Penway Building.

## A RESUME OF MY YEAR'S WORK WITH SUSPENSION LARYNGOSCOPY.\*

DR. ROBERT CLYDE LYNCH, New Orleans, La.

Last year you conferred on me the signal honor of being permitted to demonstrate to you suspension laryngoscopy as I practice it, to detail for you the various reasons for the modifications which seemed to me improvements over the instrument used by Killian.

In my contributions on this subject, up to this time I have dealt with the technique of acquiring an unobstructed view of the larynx, including the anterior commissure and in most instances a small area just superior to it, this field being sufficiently broad to enable one to practice the new type of intra-laryngeal surgery.

I will now devote the time you so generously allowed me to reviewing my work in this new two-handed surgery of the larynx. The term, while not thoroughly scientific, is descriptive and at once differentiates it from all the preceding methods. It may be in keeping here for me to say that I have not found it necessary to change the model of the instrument in any way since its presentation last year, and have added to it only in three ways: two of these because of two accidents which must be made known to you now that you may provide against such occurrences in your work.

In a case being suspended for malignancy, a man of 68, well preserved and weighing about 175 pounds, with what appeared to be good, solidly fixed teeth, the view seemed a little difficult to acquire. A little more lifting and a little jacking of the epiglottis brought the tumor well into view. A section was removed for immediate pathological diagnosis when suddenly the instrument slipped from the patient's mouth. The cause of this was a fracture of the alveolus carrying his five front teeth of the upper jaw, the mass hanging from the mucous membrane on the labial aspect. The spatula was quickly removed, the teeth wired back in place with silver wires and I am glad to report they are now firmly rooted, healthy and apparently as good as ever. To counteract this accident I now place this strap under the occiput of the patient and clamp it into the angles of the pear-shaped ring. By tightening it sufficiently, one relieves almost completely the pressure of the tooth plates against the teeth and it will be impossible for

\*Read before the American Laryngological Association, Washington, D. C., May 10, 1916.

this accident to happen again. The other accident resulted from the tongue patula breaking at its angle. As this spatula was the first made by the instrument maker its construction was not so perfect as it now is. The danger here lay in the sudden dropping of the patient's head from the spatula and a possible fracture of the cervical vertebra. To counteract this I have incorporated in my new suspension table this feature of having the head piece drop at various angles so that should the patient drop for any reason the support would be in place to receive the head.



Figure 1. To illustrate the dental spoons (two sizes) and the tooth-plates fitting in the horizontal filled-in face.

While reviewing my cases operated on from one to two years ago, I noticed in two or three of the adult cases the loss of the enamel of the teeth from contact with the tooth plate or plates. After further observation this I found to be due to the fact that there was a lateral fracture of the teeth, caused by the pressure downward and outward of the tooth plates of the mouth gag. In a few instances I have observed the loss of the enamel of the teeth on the biting edge. It also happened that in patients whose teeth were very irregular and in some instances where carious tooth

roots happened to be present or where the only teeth available to fix the tooth plates were loose, decayed or painful, that it became quite a problem to find a means of adjusting the tooth plates so as to do the least harm.

I have now surmounted these difficulties most satisfactorily by using dental impression spoons filled with moulding compound and make an impression of the entire upper jaw including the hard palate. When cold this impression must naturally fit accurately the entire upper jaw and if a tooth is loose or the gum painful in any particular spot the compound can be cut away so as to ease the pressure on this particular locality. In order that the tooth plates should now hold firmly against the smooth surface of the spoon, I have found it necessary to fill in the concavity in such a way as to give a square surface of sufficient depth for the tooth plates to gain firm hold. This has necessitated the lengthening of the tooth plates considerably and changing their shape in order to preserve the base of the fixing triangle.

Now that I have used this device a few times I find it far superior to the tooth plates in every way. It now offers complete protection to the teeth, absolutely equalizing the pressure upon the oral surface of the upper jaw. It will protect sensitive areas and loose teeth and I have no fear for the irregularity of the teeth or their condition. No more fractures of the enamel occur and the localized pain that was complained of previously is now no longer felt. It markedly facilitates the introduction of the spatula and makes it easier to keep the spatula in the middle line. Since the tooth plates have such a firm grip on the metal surface and such a broad area from pressure downward, there is much less danger of losing the view after it is once obtained. This to me is one of the best additions I have made for some time and I recommend it to you most heartily. Two sizes, one for adults and one for children, seem so far all that are necessary, and are designed to fit the one set of tooth plates.

The table that I am using is one constructed from an old high-low dental base which will permit the table to be lowered or raised twenty inches. This, you see, permits the patient, in suspension, being raised to the proper height for the comfort of the operator, thus facilitating his work. The table has various other features which may be of interest. The top is of solid maple, one and one-half inches thick, because it forms a very firm support for the traveling crane and is itself thick enough to permit of perfect rigidity. The top can be

tilted at various angles, raising or lowering the head to an angle of forty-five degrees; the top can be moved in a circle to take advantage of any light, and lastly, one can, if he chooses, perform the turning test for the labyrinth with the patient lying on the table. Foot and shoulder braces are so arranged as to fix the patient both comfortably and rigidly. The shoulder braces act effectually in preventing the patient from slipping up on the table while under heavy extension and although it is primarily designed for suspension work, it is a most serviceable ear, nose and throat operating table.

In my work I have discarded all the accessory illuminating appliances, except the deep tracheal searcher, and confine myself to an ordinary head mirror and a nitrogen lamp. The latter is always

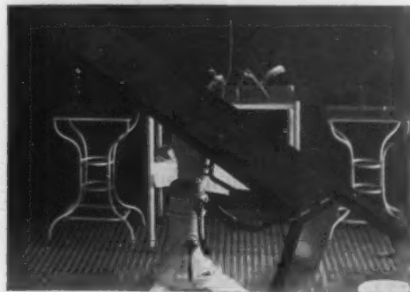


Figure 2. Table showing Lynch top with head lowered. Top can be lifted as far in the opposite direction.

ready, always works and is after all under the best control of the operator.

*Intrinsic epithelioma of larynx.* Let it be distinctly understood that I do not propose the removal of the intrinsic malignant growths of the larynx under suspension as a substitute for or advise it as better than thyrotomy, for the special reason that my own experience covers too few cases and my work is too young to be of deciding value at this time. I propose, however, to state to you my experience so that you may discuss my views and that we may establish a careful foundation upon which to work.

Mr. B. was operated on May 1, 1913. He has remained perfectly well up to this time and seems now to be in good shape. In the early part of 1914, he seemed to have a small mass at the anterior commissure which was removed and found to be only scar tissue. The tumor was removed completely and an immediate

section made at the time and since then. The tumor showed the characteristics of malignancy.

H. W. was operated in July, 1914. He is still well and has resumed his occupation of vaudeville singer, with the exception that his voice has changed from a good baritone to a fair tenor. In him malignancy, microscopically and clinically, was unmistakable.

Four cases were operated on in 1915. Three of these are well and without evidence of recurrence. The fourth is a bit interesting. Mr. H. was referred to me because of papilloma. Clinically the diagnosis was suspicious of malignancy. Fixation of the arytenoid was present, radiating pains to the ear of the same side, continued hoarseness for one year. Age 38. At operation under suspension a specimen was removed for microscopic rush diagnosis, reported papilloma and no malignancy as I have most profound confidence in our pathologist. I accordingly began a dissection of the mass and while it seemed at the time as though the larynx was clear, there still remained an indurated base which felt to me different from the preceding papilloma cases. In six weeks from the date of suspension there was a marked recurrence requiring tracheotomy and a few days later thyrotomy. At this time it was seen that the mass was infiltrating the posterior half of the larynx and there was suspicion of it having crossed the anterior commissure. Though I was not entirely satisfied with the result, we had no permission to remove the larynx as completely as possible with the thyrotomy. In three months the patient submitted to a laryngectomy and is now in most excellent health, working hard and apparently enjoying life in this altered state.

May I here repeat my advice that where one has malignancy of the larynx involving its posterior half with fixation of the joint and slight thickening or edema over the arytenoid, such a case, even though intrinsic, is unfit for operation by suspension. Under suspension one can make such an examination of the larynx as to determine an extension downward to the crico-thyroid membrane. In one case, not included in this list, we determined, by the direct method, the mass to be entirely intrinsic; no cervical glands were enlarged and we could not palpate anything to be construed as extension downward. Under suspension we could see distinctly the extension downward to the crico-thyroid membrane and in order to be certain of the position of this area, I put a fine hypodermic needle through the crico-thyroid membrane externally and used this as a land-mark. It was a revelation to see the mass beyond the needle, dipping or dimpling into the crico-thyroid space. The pa-



tient underwent a laryngectomy and has resumed his occupation of fishing and is working in comfort.

Four cases have been operated on so far this year. They are well. I mean by this that they healed and returned home to report again at intervals of three months. The fourth lost his front teeth, as before mentioned, and is now under radium, to be suspended again if the latter does not bring about the desired result.

I may mention again that dissection under suspension is not difficult and can be done without permitting an instrument to touch the tumor mass. It can include the perichondrium, does not require much time, there is no excessive bleeding, does not require the



Figure 3. Operating in sitting position, showing top raised to proper height and shoulder brace support under head properly placed to prevent accident if patient should drop from crane.

opening of the cartilagenous box, and is not in consequence followed by stenosis. None of my cases have had any post-operative disturbance and they are usually up and out as soon as the ether is exhaled. There has been no shock so far and a most surprising lack of reaction.

*Non-malignant tumors. Papilloma.* I have removed by dissection multiple papilloma from the larynx in cases ranging from 18 months to 16 years, with no recurrence in a single case so far. The shortest time since operation is five months, the longest three years. In the case reported to you last year during the discussion

of Dr. Hubbard's paper, the recurrence was beneath the cord, an entirely new site from that originally operated on and it followed an attack of whooping cough one year after the operation.

Single pedunculated papilloma and those growing from broad bases have been operated on with no recurrence to date, the cases numbering nineteen in all.

Pick the mass up and dissect it well below the base from which it grows; to be more certain curette this base, paint the area with pure alcohol and dress the wound with tincture of benzoin compound.

*Pedunculated fibroma*, growing from the loose tissue beneath the cord by a fairly large pedicle was removed by dissection and the wound sutured, healed by first intention. No recurrence.

*Vocal nodules*. Only those are selected for operation that cannot be removed by medical or contributory surgical procedures. Three cases; one congenital, two in school teachers; all symptomatically well. The school teachers have been referred to singing teachers for instruction in voice use and have remained well.

*Cyst of the aryteno-epiglottic fold*. About the size of a marble three-fourths of an inch in diameter was dissected without rupture and the wound stitched with good union and complete recovery. To remove the sack entirely is the classical surgery of cysts. It cannot be done with one hand.

*Pachydermic laryngitis*. Two cases both males, farmer and preacher, 30 and 40 years old respectively. In the former there was a hypertrophic mass at vocal process and extending along the free border of the right arytenoid cartilage; mass removed by wedge incision and free edge stitched with two sutures. Healing rapid and the result perfect. In the latter, much thickened inter-arytenoid space was much improved by three horizontal deep cauterizations with actual cautery. It was very simple and accurate to apply the cautery in this case and an easy matter to protect the surrounding structures from burning. Such procedure would be impossible without suspension.

*Perichondritis of thyroid*. Patient C. D., 20 years old, cook by occupation. Followed by abscess formation. Patient suffered intense pain upon swallowing due to the inflammatory process and dyspnea from swelling and edema of the glottis. It seemed that tracheotomy would be immediately necessary. The patient was suspended and by palpating over the swollen surface with a cotton tipped applicator a soft fluctuating area was discovered; an aspirating needle was introduced and pus obtained. Free incision was

made and the opening dilated with artery forceps after the method of Hilton. Catgut strands were placed in the incision to maintain the opening. A rapid subsidence of the swelling followed; patient was able to take nourishment freely and made a good recovery with a much disorganized larynx. At the time of the final visit one could not recognize any cords, false or true, and what was larynx was now a tube lined with scar tissue through which the patient breathed.

*Fracture of thyroid cartilage.* C. G., 11 years old, while at school, received a blow on the left side of the lateral cervical region



Figure 4. Operating in standing position. Table raised to full height of 54 inches.

and suffered at once from dyspnea, loss of voice, pain in the region of larynx aggravated on swallowing. On admission it was impossible to see the larynx and an x-ray showed a transverse fracture of the thyroid cartilage about its middle.

Under anesthesia, crepitus could be determined and with the aid of suspension we could see swelling on the left lateral half of the larynx with marked tumefaction about the region of the true cord. By manipulation we were able to reduce the fracture which re-established the larynx to its normal lumen. A large intubation tube was then introduced as a splint to maintain the fragments. This remained in place about two weeks when it was coughed out

and the larynx was seen to maintain its usual shape. About four weeks later the patient returned with marked dyspnea, due, this time, to granulations growing into the larynx presumably from the time of fracture. There was also quite an area of redundant tissue over the upper surface of the arytenoids which was drawn into the larynx with each inspiration. Under suspension the granulation tissue was removed and its base cauterized with trichloroacetic acid. The redundant tissue was actually removed by dissection and the raw surfaces stitched, requiring three sutures on each side. Healing was entirely satisfactory but the patient maintained an aphonic

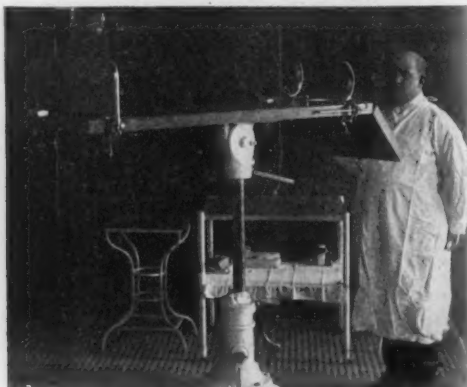


Figure 5. Table at full height with shoulder and foot braces.

voice for some time after this procedure, though under the anesthetic he cried out with a good tone. He has since regained his voice. The successful termination of this case was due in a very great measure to the suspension apparatus.

*Ulcerative tubercular laryngitis.* Six cases have been cauterized; in two, over three-fourths of the area of the larynx. There was very marked relief from pain. Healing followed in all of the cases. This, however, was only temporary, for all of the cases were of the third stage with progressive pulmonary destruction.

*Abscess of epiglottis.* The lingual surface of the epiglottis was the seat of accumulation of pus. Incision and drainage was very easy under suspension.

*Pedunculated epithelioma.* The mouth of the esophagus was the seat of lesion in my two cases. A negro 80 years old, was suspended under cocain anesthesia, the mass resected and five stitches

placed. Healing was complete by primary union. Recurrence in ten months. At the site of removal, recurrence was by a rather broad and flat ulcer about the size of a quarter dollar on the post-hypopharyngeal wall. The mass was cauterized after the technique of Percy, using a heavy electro-cautery point. Much swelling and discomfort followed. The patient has remained well with no recurrence up to this time.

The second case was in a white male. The mass sprung from the posterior lateral aspect of the cricoid cartilage and the lateral wall of the esophagus. The mass was removed and the base completely cauterized. The patient's life was prolonged about ten months.



Figure 6. Strap around head and clamped into ring on hook to prevent outward pressure on teeth and to insure steadiness of instruments.

This technique requires two free hands and is only possible under suspension and it may hold for us some hope in the fight against these lesions in this locality.

*Foreign bodies in trachea and esophagus.* In babies the suspension apparatus permits the careful passage of the tube beyond the vocal cords and subglottic space which it is so necessary not to traumatize. I have removed watermelon seeds from the trachea of children without the use of a tube, and a peanut impacted in the right main bronchus under suspension with the suction tube and no forceps. It was very easy to see the foreign body and to apply the tube. A safety pin with the point up, a jack stone and

a quarter were found in children from eleven months to two years of age. The foreign bodies were removed very nicely from the upper end of the esophagus. While this is quite possible by the usual methods, one does the work more carefully, with less traumatism and with more exactness than by the usual methods. With two hands free a part can be lifted, points protected, bodies rotated, the cricoid lifted and moved from side to side in order to permit dislodgment and extraction without tearing the mucous membrane or otherwise injuring the parts. It also facilitates the introduction of the esophagoscope in certain cases.

I prefer, however, when working with an esophagoscope for a bronchoscope to introduce the tubes unaided. If suspension is necessary for their introduction the patient should be relieved from the suspension apparatus after the tube has been passed so that subsequent manipulation will not be interfered with.

634 Maison Blanche Building.

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**The Treatment of Epithelioma of the Lower Lip.** RUSSEL H. BOGGS, *Interstate Med. Jour.*, May, 1916.

As experience has taught that an epithelioma of the lower lip is rather a regional than a local lesion, surgical removal, wide and radical, has proved inefficient because a recurrence takes place in over 50 per cent of cases when there are no palpable glands at the time of operation, and in over 75 per cent of cases when glandular involvement is present. The author believes that radiotherapy (meaning radium and the Roentgen rays) will give better results than surgery and surgical removal should only be done in selected cases. The technique, when using radium or the Roentgen rays, must be varied somewhat for the individual case. One advantage of radium is that it produces a more intense reaction, which disappears much more rapidly than a reaction of the same degree produced by the Roentgen rays. Before a case is considered clinically cured the resulting scar must be healthy, pliable, without any retraction and without scaliness. The treatment of the adjacent glands is most important and should never be omitted, no matter how small the lesion.

P. F.



**REPORT OF THE REMOVAL OF A FRAGMENT OF TRACHEOTOMY TUBE FROM THE LUNG, SIX YEARS AFTER ITS INSPIRATION.\***

DR. FRANCIS R. PACKARD, Philadelphia.

The patient whose case I report was an Italian, 33 years old. Twelve years previous to the time at which I saw him, he had suffered from typhoid fever, having been a patient at the Pennsylvania Hospital, Philadelphia, for three months. During this illness he had an abductor paralysis of the vocal cords, necessitating intubation. The tube remained in the larynx for two months, when it was removed and the patient discharged from the hospital as cured.

One month after leaving the Pennsylvania Hospital, he had an attack of dyspnea, and spat up large quantities of blood. He was admitted to the Philadelphia Hospital, where a tracheotomy was performed. The patient remained in the Philadelphia Hospital for six months, when he was discharged still wearing his tracheotomy tube. This was twelve years ago, and he remained in a fairly comfortable condition subsequent to that time for six years, when he said that one day during a coughing spell he coughed up the tracheotomy tube which he was still wearing and found that the lower end was broken off and missing. He stated that he had not had the tube out for cleansing or any other purpose for three years up to that time. Since that time, six years ago, he had suffered from violent attacks of coughing, accompanied at times by the expectoration of blood, and considerable pain in his chest. He stated that one of these attacks was so severe that three years ago he was in Bryn Mawr Hospital for eleven days with fever and pain in the right chest. There is no record in the hospital, however, of his having been a patient there at any time.

For the past six months he has had great exaggeration of all of his symptoms and has been obliged to give up his work because of shortness of breath, cough, pain in his right chest and quite a profuse spitting up of blood.

I first saw him in April, 1915, when he came to the Pennsylvania Hospital. No very definite history at that time was obtainable; as he was unable to talk English and he had no interpreter.

\*Read before the American Laryngological Association at Washington, D. C., May 11, 1916.

He was wearing a tracheotomy tube and complained of the symptoms above reported. I had an x-ray examination made of his chest which resulted in the discovery of a foreign body lodged in his right bronchus, opposite the fifth interpostal space. He left the hospital the day after his admission refusing to have anything done for his relief. Three months later, on July 14, 1915, he appeared at the Bryn Mawr Hospital, at which institution I was on duty, and another x-ray was taken showing the foreign body in the right bronchus, the same location as that revealed by the previous

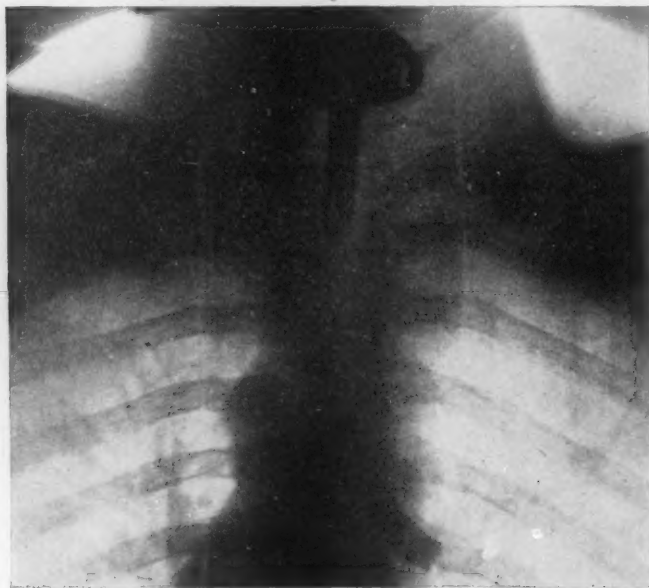


Fig. 1.

x-ray three months before at the Pennsylvania Hospital. I had the patient etherized, and on removing the tracheotomy tube, which we had been unable to disturb before because of the patient's resistance and unruly behavior, I found, to my surprise, that it contained an obdurator. I passed a Jackson bronchoscope through the tracheotomy wound and without difficulty succeeded in extracting with forceps the fragment of tracheotomy tube which I show herewith. The patient was returned to the ward in good condition. He reacted from his anesthetic and left the hospital in excellent condi-

tion three days later. He had absolutely refused to have anything done towards closing the wound in his neck and trachea.

The points of particular interest in the case seem to me that he had retained a foreign body of this nature for six years in his chest producing such marked symptoms without arousing the suspicion of its presence either in the mind of the patient or the number of physicians who had examined him from time to time. It



Fig. 2.

was only after the fragment of the tracheotomy tube was removed from his chest that we succeeded, by means of a clever interpreter, in eliciting the history that he had six years before noticed that the tube was broken when he took it out. Secondly, I think it is curious to reflect that for some unknown reason he had worn an obturator in the tube, a fact which was only ascertained after the removal of the tube on the operating table.

302 South Nineteenth Street.

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**Syphilis of the Larynx.** J. WEINSTEIN, *N. Y. Med. Jour.*, July 22, 1916.

In syphilis of the larynx the prognosis is favorable when the patient is seen at an early stage and the results are often brilliant. But where considerable progress has been made by the disease and where scar-tissue has already formed, the chances of marked improvement are small. The condition is grave, complete and permanent paralysis of the vocal cords, destruction of the cords and adjacent structures and serious difficulty in swallowing being some of the complications. In the tertiary stage, serious stenosis may occur, requiring an immediate tracheotomy. The author reports a case in a man, thirty-seven years old, whose only complaint was hoarseness getting progressively worse and in whom the left cord was found to be reddened and infiltrated. Wassermann test four plus. Immediate response to a single neosalvarsan injection.

P. F.

## GENERAL SURGICAL PRINCIPLES AS APPLIED TO TONSILLECTOMY.

DR. WATSON MARSHALL, Pittsburgh, Pa.

The surgery of the faucial tonsils differs in no essential detail from the surgery of any other structure of the body. On reviewing the literature, one encounters many convincing arguments for placing this operation in the category of *major* surgery. More emphasis should be placed on the fact that tonsillectomy is *surgery*, and the debate continued when this prime premise is generally admitted. If it is surgery—which would seem to be self-evident—it should be approached in a surgical way—all those broad principles which govern general surgery accepted and faithfully followed. Every detail of technique should be critically scrutinized and adopted only when the demands of good surgical principles are satisfied. The very application of these principles gives at once the answer to the question—is tonsillectomy a major operation?

Thoroughness and safety are ideals which the surgeon has ever in mind, and all that is suggested in this paper makes, we believe, for the approximating of these ideals.

*Diagnosis:* The curse of tonsil work, from the laryngologist's point of view, has been the apparently endless procession of cases coming to our clinics for operation. The result has been "haste"—haste in diagnosis, in operating, and in post-operative handling of the cases. In no branch of surgery has there been such a wealth of available pathological material, and nowhere has there been such a lack of co-relation between the pathological findings and clinical data. This has been ascribed to indifference on the part of laryngologists. It is in fact due to the great disproportion between the amount of clinical and laboratory routine work required, and the number of clerks and assistants required to do the work thoroughly. It is, however, very gratifying to find in the more recent literature, evidence of reaction in this regard, and comprehensive reports of tonsil cases are now appearing—indicating that laryngologists are giving to their tonsil cases the attention they really merit. No individual should come to any operation, unless it is an emergency case, without a complete note of his complaint, personal history, and physical condition. This applies to cases of tonsillectomy with no less force than to any operation. It is of vital importance,

if we hope to learn just what results we may with confidence expect in any given case, and I think we might set this down as our first rule.

*Anesthesia:* In the majority of European clinics no anesthesia is given for either tonsillotomy or tonsillectomy. We maintain that this makes for neither thoroughness nor safety. It is quite within our own memory that such cases were thus handled in American clinics; however, American laryngologists are now practically unanimous in declaring for some form of anesthesia. To all of the local agents the same objections may validly be made. To do a thorough operation, the parts must, to all intents and purposes, be at rest. This can rarely be secured in tonsillectomy under local anesthesia. With the parts in alternating contraction and relaxation, one cannot operate with the deliberation afforded by a general anesthesia. The possibility of secondary hemorrhage due to reaction of the local anesthetic is a source of constant concern to the operator. One can never tell, on injecting cocaine or other local agent into the tonsillar region, what the amount of absorption will be, nor can he inform himself in every case of any peculiar susceptibility of which his patient may be the unknowing victim. The opportunity to eliminate the probability of post-operative bleeding is at the time of operation and bleeding points cannot be attacked with the best results under local anesthesia. Of the general anesthetics, chloroform has been discarded almost universally, and for reasons that are quite sufficient. Ether alone, or preceded by nitrous oxide, or, in adults, by morphia and atropin in varying doses, is still our most dependable ally. The common error in the use of ether is the so-called interrupted anesthesia. We can see no more logic in interrupting the anesthesia for tonsillectomy than for appendectomy.

The uninterrupted anesthesia is simple in administration and the fact that the anesthetist, the operator, and the assistant are all in position to judge of heart action and respiration reduces the possibility of too deep anesthesia to the minimum. Nitrous oxide is being used exclusively in some clinics. Ether and oil by rectum is being tried but cases sufficient to warrant the general adoption of either method have not as yet been reported.

We may state as our second general principle the following: The parts attacked, as in general surgery should be at rest. This, however, must never be secured at the expense of the patient's safety.

*Illumination:* The next principle is so patent that its statement would seem quite unnecessary. The general surgeon and the laryngologist have at times cases which must be done at least in part by

the sense of touch. Good illumination and a thorough exposure of the field of operation are so easy of attainment in tonsillectomy and so very vital to success that the omission of either would seem, *a priori*, to be very poor surgery. We would object to the finger dissection solely on the ground that it, to no good purpose, substitutes the sense of touch for the more accurate dissection under direct inspection.

*Method of enucleation:* Laryngologists, and internists as well, are practically unanimous in accepting a dictum long since laid down—namely, that any tonsil that is in such condition as to warrant tonsillotomy, should be completely enucleated. One needs but to refer to the researches of Dr. W. W. G. MacLachlan, of Pittsburgh, and Dr. Barnes, of Harvard, to be quite persuaded of the accuracy of this opinion.

Having decided on the enucleation of the tonsil, what method shall we adopt? Every operator has his own technique, but one finds in the literature on this subject, an evident tendency to argue for the general adoption of some particular method. We feel that the argument should center about the principles of surgery rather than about the details of any one method. It matters very little, after all, what model of seizing forceps one uses, provided he is able to grasp the tonsil firmly and make what traction may be necessary without tearing through the tonsil. Any mouth gag which may be introduced with ease and which remains securely in position—any tongue depressor by which a good view of the fauces is obtained. There are some who argue for the dissection with sharp instruments. There is a larger number—we believe, fortunately—who prefer blunt dissection. As in general surgery, one must adapt his method to the requirements of the case in hand. There should be in this work the same variation in method as one finds in a general surgical clinic. Diseased tonsils vary widely in their pathology and the fauces, which harbor the diseased tonsils, are not all identical anatomically and the fact that we are removing a tonsil as opposed to an appendix, should not, per se, doom our patient to any hard and fast lines in technique. The enucleation can, in many cases, be done entirely by the blunt method. In many others it is of advantage to begin the dissection with the sharp knife—as advised by Fetterolf—but, we feel, that the further use of the knife is not warranted by the anatomy of the part. In enucleating any of the glands of the body, once the surgeon has come down on the capsule, if one be present, he as a matter of surgical principle, resorts to blunt dissection. When the capsule of the tonsil is exposed throughout the periphery of the gland, we feel that the wire



loop is our most surgical method of blunt dissection; because in the tonsil, as opposed to other glands, we have, so to speak, a fibrous track from which there is no possible escape except in unusual pathological conditions. There thus remains in the depth of the fossa, the superior constrictor of the pharynx covered with its smooth aponeurotic fibrous tissue.

In some American clinics the blunt dissection (scissors-hemostats, etc.) is continued throughout the enucleation. We believe that this, in turn, is not good surgery for the reason that one is more likely to cause unnecessary and excessive bleeding from injury of the veins in the depths of the fossa. This bleeding occurs at a time when its source is almost completely obscured by the mass of the tonsil. An irregular surface is presented after the tonsil is removed and on such a surface small bleeding points are with difficulty located. The general surgical principle of prompt arrest of bleeding is in this way largely ignored. With the proper use of the snare, bleeding points are readily seen on the untorn surface and rational surgical control of bleeding is rendered possible and only in isolated cases, difficult.

The chief anatomical points which the laryngologist has in mind are the capsule with the plicae, the blood supply, and the musculature of the fauces—chiefly the palato-glossis, the superior constrictor, and palato-pharyngeus. Regardless of the method one employs, the most vital point is to be guided by what we may list as the fourth principle: The preservation of the integrity of surrounding structures. This applies with striking force to tonsillectomy inasmuch as the preservation of the physiological function of the fauces depends on the absence of insult and injury to the parts at the time of operation.

*Bleeding:* The methods of handling bleeding from the tonsillar fossa differ in wide degree. Many skilled operators are content with making simple pressure with cotton or gauze while others of equal skill go to the extreme of placing ligatures on all bleeding points, be they ever so minute. Once more we must appeal to the general surgeon. If on account of excessive bleeding, the severed vessel cannot be seen, firm pressure with gauze clears the field and a hemostat is applied.

If any structure (as in tonsil case, the anterior pillar) obstructs the view, it is drawn to one side. All bleeding points eventually are picked up and the surgeon's judgment dictates which of them shall be ligated. If the vessel involved is of very small caliber, hemostat without ligature is all that is indicated. Should

a small vessel continue to ooze, he usually resorts to ligature. There is no application of astringents, styptics or other agents which while giving temporary assistance carry with them the possibility of reaction resulting in secondary hemorrhage.

The fifth guiding principle, we think, should be the following: The prompt arrest of all bleeding points and the adoption of the general surgical method of handling bleeding areas. This will not render post-operative hemorrhage impossible but will reduce its probability. No patient should leave the operating table until all the primary hemorrhage is under absolute control, and until we have exhausted rational surgical means to forestall post-operative bleeding. Our patients have a moral claim to all the protection against complications which careful technique may afford and the number of cases we may have for operation or the question of economy of our own time should carry no weight.

As to adenoid bleeding, we can see no more reason for disregarding bleeding from the naso-pharynx than from any other part. The fact that the bleeding will stop without surgical interference constitutes no reason for its being allowed to do so. It is a comparatively simple matter after removal of adenoids, to place a soft gauze pack in the naso-pharynx anchoring it with silk to the mouth gag. The bleeding is at once controlled and after the removal of the tonsils the pack is removed. One can with a little care avoid insult to the Eustachian orifices. We have observed no bad effects though quite aware that many operators object to the method.

*Time required for the operation:* The plea for the adoption of a certain technique on the ground that it requires only a few seconds or at most a few minutes, is frequently met with in the literature. The surgical operations in which the element of time *must be* a controlling factor are very few, indeed, and tonsillectomy is not one of them. There was a time when the surgeon who could remove an appendix in a very few minutes, was hailed as a great technician. Fortunately for patients requiring that operation, that day has passed and we look for its passing in tonsillectomy. Any method of handling these cases whose chief claim rests either on the extremely short time required for its performance or the ease with which the enucleation may be carried out, should, before its adoption, be gauged by the standards of good surgery. We would state as our sixth principle: Operations, including tonsillectomy, should be done with dispatch, but never at the cost of thoroughness or safety.

Two elements in tonsillectomy which might to advantage be improved are the anesthetic and the prevention of bleeding. While, of the general anesthetics, ether is the most dependable, it would be a great boon if the efficacy of some agent which could be administered independently of the lungs, were established. The second ideal gives me warrant in presenting this paper. It is the hope of every surgeon to ligate vessels which he may subsequently sever, and while we have not as yet developed our technique to the point where all the vessels of the tonsil are, before enucleation, tied off, we are now able to render the upper two-thirds of the fossa bloodless in the great majority of our cases. Dr. J. Leslie Davis in his discussion of the anatomy of the tonsil claims that all the vessels of the tonsil may be demonstrated at what might be called the central point of the capsule. The view is in direct contradiction of the long established teaching on the blood supply of the tonsil. Whether this view be correct or not, it is a fact that in the course of tonsil enucleation one can demonstrate the vessels to which he refers.

We first separate the anterior and posterior pillars from the tonsil by either the blunt or sharp methods or by a combination of the two. The upper blade of the seizing forcep is then passed over the upper pole of the tonsil and while gentle traction is being made in the direction of the midline, blunt dissection is made from above downward on the outer surface of the tonsil. This dissection may be carried with perfect ease in most cases to the upper limit of the lower third of the tonsil. It is then a comparatively simple matter, as the tonsil is folded on itself from above down, to pass a curved ligature carrier about the vessels above mentioned. When these are made secure, we resort to the snare for the completion of the enucleation. We have then to deal only with bleeding vessels in the lower third of the tonsillar fossa. We are aware that in ordinary cases the major part of the bleeding arises in the lower half of the fossa and that our suggestion at best eliminates bleeding from only the least annoying region. We are most hopeful, however, that basing our technique on work now being done under Dr. Sheldon in the anatomical laboratory of the University of Pittsburgh Medical School, we will shortly be able to make modifications which, while not eliminating bleeding during the dissection, will reduce the bleeding which follows the enucleation to the lowest minimum.

We make but one claim for the suggestion, namely, that it is along the lines of good surgical principles.

Diamond Bank Building.

## HYPERPLASIA OF THE PARATONSILLAR GLAND AFTER TONSILLECTOMY. PRELIMINARY REPORT.\*

DR. HAROLD HAYS, New York.

I have used the term paratonsillar gland to indicate the presence of a mass of tissue attached to the posterior pillar of the fauces which takes on a certain amount of hyperplasia after tonsillectomy.

In a few instances, after doing a complete enucleation of the tonsils, I have observed the presence of a mass either on one or both sides of the throat which at first made me think that my tonsil operation had been faulty. In the first instance of this kind there was a growth attached to either posterior pillar, about the size of a hazel-nut, which had a tendency to become inflamed two or three times a year, giving all the symptoms of acute tonsillitis. There was never an evidence of any cryptal infection. When I observed a second and third case I became convinced that the tissue was not tonsillar tissue but a hyperplasia of a lymphoid mass situated in the posterior pillar. The first case was operated on over three years ago. The other cases were of shorter duration.

It was not until a microscopic examination could be made of one of these masses that one could definitely assert that the tissue was not tonsillar tissue, but merely hyperplastic lymphoid tissue.

In the second case that came to my notice (the patient was operated upon at the City Hospital), a complete enucleation of both tonsils was performed under local anesthesia. Within a few weeks a report was made that a large mass of tonsillar tissue had been left on both sides. An examination of the throat showed definitely the presence of tissue which resembled very closely ordinary tonsillar tissue. The mass from both sides was removed and sent to the laboratory where a microscopic examination was made by Dr. John H. Larkin. He reported as follows: The tissue proves to be lymphatic tissue, not tonsillar tissue, and shows a marked swelling of the germinal centers. There is no evidence of crypts. The tissue is partially encapsulated. Such tissue is lymphatic tissue in and around the soft pillars. There is no evidence of recent growth, tuberculosis, malignancy, or syphilis. Such encapsulated tissue is not uncommon in the pillars of the fauces.

\*Read before the Section on Laryngology, New York Academy of Medicine, March 28, 1916.

The question arises as to the cause of such hyperplasia. I have come to the conclusion that one or more nodules of lymphatic tissue are microscopically present in the pillar of the fauces, particularly the posterior pillar. Such tissue tends to grow rapidly and to a remarkable size, and attempts to take on some of the functions of the tonsils. As apparently the tonsil has the function of warding off certain infections which might otherwise enter the system, Nature attempts to take its place in certain instances by creating a new growth which takes on this same function. If the tonsil is capable of an internal secretion, the paratonsillar gland may be in some ways compared to the parathyroid gland.

The tendency on the part of Nature to create new tissue to take on the function of tissue that has been removed is not at all new.



Fig. 1.



Fig. 2.

1. Hyperplasia of paratonsillar tissue on both sides, four years after tonsillectomy.

2. Paratonsillar gland demonstrable on right side, six years after tonsillectomy.

Hodenpyl (*Medical Record*, Nov. 12, 1898) reports "A Case of the General Compensatory Lymphatic Hyperplasia in a Case of Apparent Absence of the Spleen." In this case examination of the abdomen showed a considerable lymphoid hyperplasia of the mesenteric nodes with very little increase in the connective-tissue stroma. There had been but slight proliferation of the endothelium normally lining the reticulum. It was evident to Hodenpyl that there had been in the mesenteric as well as in the retroperitoneal lymph nodes an actual and considerable increase in the normal elements, i. e., a compensatory hyperplasia.

In the accompanying illustrations the masses of tissue can be seen attached to the posterior pillar. These masses are of considerable size and can well be taken for remnants of tonsillar tissue. I, as well as others, have frequently observed the presence of irregular masses of lymphatic tissue upon the pillars and on the

posterior pharyngeal wall after tonsillectomy, which masses have had a tendency to become inflamed and sometimes have given the characteristic picture presented in acute tonsillitis. Such masses must not be confounded with the paratonsillar gland which usually protrudes from the posterior pillar as one distinct mass, which has no indentations or crypts of any kind whatsoever.

In my experience which extends over a number of years, during which time I have done hundreds of tonsillectomies, I have observed the presence of the paratonsillar gland in only four cases.

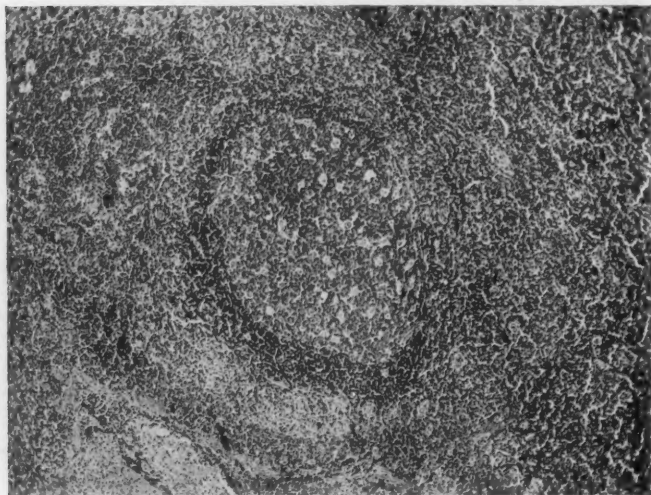


Fig. 3. Microphotograph of section of paratonsillar gland. The increase in the germinal center is well shown.

We (Dr. Larkin and the writer) expect to investigate this matter more thoroughly. We hope within a short time to begin a thorough serial microscopic examination of the pillars of the fauces in order to discover the amount of lymphatic tissue residing therein, and hope to be able to prove that there is a certain definite gland in the posterior pillar which one may call, for want of a better name, the paratonsillar gland.

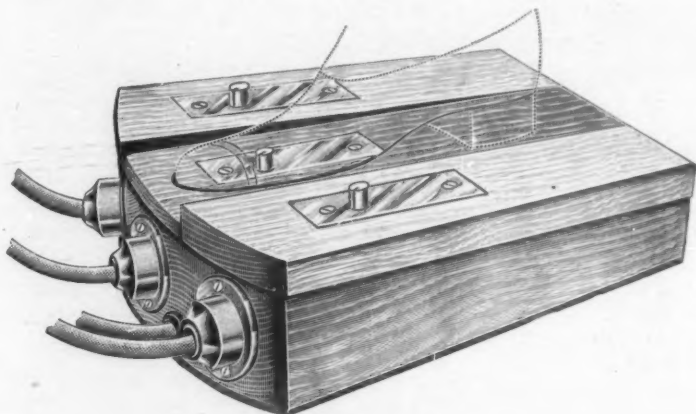
11 West Eighty-first Street.



### AN ELECTRIC FOOT-SWITCH.\*

DR. ALICE G. BRYANT, Boston, Mass.

The instrument to which I wish to direct your attention is an electric foot-switch. It is particularly suited to the office needs of the laryngologist and otologist. Without going into all the niceties possible, we may say: The electric foot-switch consists of a casing of a block of wood. The current is supplied to the foot-switch by means of a cord passing through a perforation in its anterior wall. The anterior wall is also rigged up with three cords and plugs that serve as emitters of the current. These cords may be attached at one's pleasure to three machines at the same time.



On the upper surface of the block of wood, there are three brass rods placed widely apart and protruding an inch above the surface. By pressing the brass rod with the foot, the electric current is turned on; and, by again pressing the rod with the foot, the electric current is turned off. Thus the machines, with cords and plugs attached, stand ready for use; and, by pressing a rod with the foot, we have a third hand. What is more, in this way, we avoid soiling our fingers as we should if we should turn the current on and off in the usual manner. Further, by this method of controll-

\*Presented at the twentieth annual meeting of the American Academy of Ophthalmology and Oto-Laryngology, Chicago, October, 1915.

ing the current, we avoid using more electricity than we actually need. Among the many advantageous characteristics which have commended the above apparatus to my use, the more important may be summarized as follows:

1. Operated in a cleanly manner.
  2. Current on and off at will.
  3. Omittance of skilled office attendant.
  4. Efficiency of service.
  5. Simplicity of construction.
  6. Ease of operation.
  7. Ability to stand severe service.
  8. Low cost of maintenance.
  9. Direct communication with line.
  10. Increased radius of operation from a single line or switch.
- 502 Beacon Street.

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#### **Experimental and Clinical Demonstration of Sound Conduction.**

DR. A. MAURICE, *Revue de Laryngologie, D'Otologie et de Rhinologie*, February 15, 1916.

As a result of his experimental and clinical investigations, the author concluded as follows: (1) Sound vibrations received by the drum may be transmitted at the same time by the air (*fenestra rotunda*) by the ossicular chain (*fenestra ovalis*) and by the bone. (2) The rigidity of the ossicles does not greatly interfere with sound conduction, but impedes the accommodation. The function of the ossicular articulation is the accommodation and not the transmission of sound. (3) Porosity of the ossicles and of the labyrinthine capsule retards sound transmission. In sclerotic cases with an almost normal drum, deafness is due to modifications of the bony tissue. (4) The round window acts as a valve. This function is shown when the drum is perforated or when the ossicles and the drum are destroyed. (5) When the tympanic mechanism has been destroyed, the *fenestra ovalis* can supply the role of the *fenestra rotunda*, but one or the other must be prevented from vibrating. (6) The Eustachian tubes serve to equalize the atmospheric pressure on the two sides of the drum, but they must be closed to permit acute hearing and their periodic openings should be transient.

W. SCHEPPEGRELL.

## EDITORIAL DEPARTMENT

### PERORAL ENDOSCOPY AND LARYNGEAL SURGERY.

Edited by

DR. CHEVALIER JACKSON, Pittsburgh and New York.

DIN.

Vocal abuse is a well known factor in the etiology of vocal nodules, hyperplasia, keratosis, and various inflammatory diseases of the larynx. It has seemed to us that much vocal abuse arises from the effort to make the voice heard above the din of modern civilization, for example, conversational efforts in a railway train or a traffic-crowded city street. It was with the hope of seeing this point strongly urged that we procured a copy of "The City of Din," by Dan McKenzie.\* Though we were disappointed by our inability to find corroboration of our views on this point, we came upon a most cleverly and entertainingly written reform book. Abuse of the larynx is mentioned only in connection with the *production* of noise. We read: "In vocal music—I dare not call it singing—in vocal music, on the other hand, Wagner has certainly achieved this much of success, that only vocal cords of a leathery texture are capable of enduring the force he demands of them. One result of this is, as every teacher of singing knows only too well, that so great is the strain thrown upon the voices of modern operatic singers that only a few of them, and those not of the finest, can retain their quality unimpaired for more than a few years. Bases and contraltos must always be deep and impressive; tenors and sopranos high and thrilling.

"Blaring music is, in a word, noise, and the vilest of all noise, for lilies that fester stink far worse than weeds.

"This kind of bastard music has found its most perfect exponent and most accurate interpreter in de Sousa, typical product of the loudest and noisiest of all civilizations, the American.

"Hail! de Sousa! Triumphant Expositioner of Transatlantic Din! Conquering and to conquer!"

Strauss's music is parenthetically referred to as "shrieks and wails."

\*Adlard and Son, Bartholomew's Close, London, England.

The motor-horn comes in for just censure. "Surely never before in the whole raucous history of din have such fiendish contraptions split the air." The injurious effect of the continual battering of the nerve-centers by noise and the harmful effects of din on the auditory apparatus are ably and interestingly discussed; not however, from the abstrusely scientific standpoint. It seems quite proper that a book urging reform in public customs should be written in a popular vein, with brief, though clear, explanations of scientific phases of the subject. The author has accomplished this wonderfully well. The author states that: "What tinnitus is to a deaf patient, the noises of civilization are to the city-dweller. The modern city is suffering from tinnitus, as incessant, as persistent, as distracting as that symptom can be at its worst. And this in an age when comfort and refinement in other directions have so sensitized the nervous system that it reacts to stimuli in a manner unknown in bygone days."

Doubtless all readers will agree with the author's definition of noise as "unpleasant sound;" but some readers doubtless will disagree with him that "Thunder is not unpleasant. Therefore, it is not noise." Others will cavil at his total omission of any mention of the bagpipes! Personally, we know of no sweeter sound than the far-away pastoral notes of the pipes we once heard in the Highlands. But they were very, very far away.

Among the remedies suggested are the abolition of the locomotive whistle and the motor horn and the audition of discordant church bells by the inspector of nuisances. For the night-howling cat the author humanely suggests nothing worse than "chastely cold water" propelled by an ear syringe! Which reminds us of the shoemaker's dictum: "There is nothing like leather." Another humane remedy is the suggestion to breed a "barkless dog." It is recommended that ears delicate by nature or disease should be protected against loud sounds by plugs or ear-coverings, exactly in the same way that people with weak eyes are advised to wear tinted spectacles in a bright light. Probably all otologists and engineers will agree with the author that something can and will be done to ameliorate the harmful effects of noisy occupations. The suggestion to place bedrooms at the back of street-houses seems excellent. There seems no sufficient reason why American cities should not be made as quiet as London. It is only too true, however, that as Dan McKenzie states: "To an American fresh from the harassing din of New York, Chicago and other transatlantic cities, London seems curiously peaceful." Reform like charity should begin at home,

therefore we suggest that the medical man first take the beam out of his own eye by eliminating the unnecessary noise of the "horn" on his own motor car. As Dr. McKenzie points out, slower and more careful driving lessens the necessity for so much noisy warning. He has, himself, thrust his head out of the taxicab window and bidden the driver, "Don't drive so much on the horn." In this country the traffic laws of most states require the horn to be sounded when overtaking, approaching curves of short radius, etc., and neglect to do so, in case of accident would render the driver liable for negligence. Doubtless the use of the horn could be forbidden, as Dr. McKenzie suggests, between the hours of ten p. m. and seven a. m., especially as during this time the lights afford aggressive ocular warning. The author seems to have done his book an injustice in giving it the sub-title of a "Tirade Against Noise." It is not long drawn out and is too pleasant in style to be called a tirade. The book is of convenient size for the pocket and we would urge that a copy be procured instead of a magazine for use during the next railway journey. It may prove, as it did with us, to be so entertaining that the reader will be oblivious to the din of the railway!

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**Sarcoma of the Frontal Lobe Giving Rise to Ocular Signs Only.**

R. B. HIRD, *British Med. Jour.*, May 13, 1916.

The patient, a man of 34 years, noticed four months previously that almost every night he was kept awake by a pain in his right eye. During the day very little was noticed but towards evening he experienced shooting pains. About a month later he noticed that his right eye became prominent. In addition to the moderate exophthalmos the eye was also displaced downward and a little outward. Considerable ptosis. Corneal sensation good, pupillary reactions normal. Right fundus showed marked optic neuritis; left fundus, early optic neuritis. Autopsy showed a tumor the size of a tangerine orange in the right frontal lobe which, on microscopic examination proved to be a round-celled sarcoma. This growth also invaded the orbit and the nasal accessory sinuses. P. F.

## SOCIETY PROCEEDINGS.

### PHILADELPHIA LARYNGOLOGICAL SOCIETY.

*Meeting October 3, 1916.*

DR. SIDNEY L. OLSHO, REPORTER.

#### Tonsilloscopy and Curettage of the Tonsils in Adults. DR. THOMAS R. FRENCH.

French calls attention to a new method of examination of the tonsils by transillumination in situ, which is effected by means of a diagnostic electric lamp carried on the end of pencil-like rod. To one end of the rod, the cords to the battery or current find attachment. The illuminated end is bent at an obtuse angle about one inch from its extremity. The lamp is a small Tungsten, shaded at its end and on three sides by a closely fitting hood. The light is passed into the mouth and behind the tonsil and held firmly against the posterior pillar and the posterior surface of the tonsil. The hood serves to throw the light forward through the tonsil under observation. In some cases a 4 per cent cocaine solution is first applied to the posterior tonsillar surface.

Under transillumination the healthy tonsil presents two parts for examination, namely the glandular tissue and the pillar. These are of two well contrasted colors. The glandular tissue is of a uniform amber. The color of the pillar is deep crimson. Any deviation from this normal color relation is indicative of disease.

French divides the tonsils into six arbitrary groups:

1. Healthy tonsil.
  2. Borderline conditions, e. g., upper portion of tonsil of deeper color. Deepening not uniform, e. g., hyperemia.
  3. Superficial abscess.
  4. Deep abscess. Center or a limited area darkened, of same color as anterior pillar.
  5. Considerable general disease. No abscess but all of the gland shows a darkening. There is loss of contrast with color of anterior pillar. Some very dark points.
  6. Extensive general disease. Tonsil all dark. No contrast with pillar.
- A dark room is not essential for these examinations. For more accurate study a metal observation tube, of one-half inch bore, about four inches long, is used. It carries a convex lens near its distal extremity, which can be focused and is really a simple microscope. One end of the scope is applied directly to the surface of the transilluminated tonsil. The eye is closely applied to the other end.

Tonsils which have been removed are studied under transillumination in a small dark chamber, specially constructed and electrically equipped. Histologic studies are made to verify pre-operative findings.

French advocates the conservation of tonsils and the curettage of circumscribed pus pockets and diseased areas, the limits of which can, by his methods, be accurately determined.



*Meeting of November 7, 1916.*

**Individual Paper Ear Protector.**

Dr. Sidney L. Olsho showed an individual paper protector for office use, while treating a suppurating ear. Each protector is a circular white filter paper, six inches in diameter, with a central oval opening about one by two and a half inches in size, large enough to permit the ear to pass through. One of these sterile papers is slipped over the ear. It does not readily fall off. The auricle and canal are exposed, surrounded by a clean, hair-free surface. The fingers of the attendant are kept free from this source of contamination and annoyance. The protectors have been found particularly useful on women patients who dress the hair low over the ears. All of the strands are behind the paper. It is better to have the central opening a hemi-ovoid, viz.: a straight line anteriorly and an ovoid curve fitting the posterior surface of the ear.

**End Results of Two Radical Killian Operations.**

Dr. Ross H. Skillern presented the patient, a colored girl, age 20, first reported February 1, 1916 (*Penna. Med. Jour.*, March, 1916, p. 467), in whom had been successfully imbedded a solid block of paraffin, weighing about 2 grams, for the correction of a deformity following a frontal sinus operation. The result was all that could be desired at that time. Since then a hernia developed at the operative site. A small sinus formed. The sinus was opened and the entire block of paraffin was removed. The space originally occupied by the paraffin was found to be occupied by healthy connective tissue. The wound was again closed and again it healed. The deformity at the present time is not great. Small injections of paraffin are being given.

Dr. Ross H. Skillern showed a case of frontal sinusitis following influenza. Male, age 25; the history being that shortly after the grippe, the left eye began to swell. Something broke inside the nose. Several minor operations were performed in the nose. There were a number of recurrences treated by poultices and incisions. The patient came to the hospital with a discharging fistula at the inner canthus. A Killian operation was performed October 24, 1916. A large sequestrum was removed. There was pus on both sides. The left inferior wall and the ethmoidal cells were removed and free drainage through the nose was established. The patient is presented with all of the external wound healed, a little deformity and only a slight diplopia due to imperfect action of the pulley of the superior oblique.

**Demonstration of Mosher's Esophagoscope.**

Dr. Robert F. Ridpath demonstrated esophagoscopy with Mosher's esophagoscope for which the following advantages were claimed: The oval shape and the matrix made for an easier passage. The light, being at the distal end, gives better illumination. As the esophagoscope is ballooned by means of a bulb, a larger field is exposed to view at one time and the scope descends readily as the ballooning is performed.

**Subglottic Papilloma.**

Dr. Matthew Erner showed a case with a subglottic papilloma of the larynx, removed by suspension laryngoscopy with the Lynch apparatus.

**Case of Objective Tinnitus Aurium.**

Dr. George M. Coates showed a case of Endotic Noise in a man aged 35. The patient has been under observation four to five years. He is in good general health but of a neurotic temperament. He had an otorrhea on the right side for years. The membrane is absent and the ear is now dry. There is a non-suppurative, middle-ear catarrh on the left side. A clicking is present in the right ear, like that of a large watch. It may be heard at a distance of eight to ten feet from the patient. It is not synchronous with the heart. The patient can stop it voluntarily but cannot keep it stopped. He is also able to start it when it is stopped.

Endotic noises are of two kinds, ticking and murmurs. The latter are vascular, *e. g.*, aneurysm of internal carotid. Some are said to be due to a spasm of the tensor tympani muscle.

Dr. Lindauer mentioned one of his cases, a neurotic woman. A loud murmur, synchronous with a heart murmur was heard some distance from the patient. The murmur disappeared following a rest-cure and bromides.

**Papilloma of the Uvula.**

Dr. Arthur J. Wagers presented a male adult patient with a smooth, pedunculated papilloma of the uvula. The growth is about  $\frac{1}{2}$ -inch long and about  $\frac{1}{8}$ -inch in diameter. It originates on the right side just a little posteriorly.

**Case of "Telephone Ear."**

Dr. James A. Babbit gave a brief preliminary report of a case of "telephone ear" in a telephone operator. The symptoms are a beating pain in both ears and pain in back of the ears radiating to the occiput. The pain intermits but the patient is always "conscious of her ears."

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**Atrophic Rhinitis (Ozena) and Tuberculosis.** DAN MCKENZIE,  
*Jour. Laryngol., Rhinol. and Otol.*, May, 1916.

The author's investigations, clinical, histological and bacteriological, have led him to the following conclusions:

- (1) There is *post-mortem* evidence of the frequent association of tuberculosis and ozena, and (2) clinical evidence in the personal and family histories. (3) In the majority of cases of ozena tuberculin tests showed active tuberculosis and (4) this was supported by the phenomena and results of tuberculin treatment. (5) There is some evidence tending to show that ozena is commoner in patients with pulmonary tuberculosis than in the general community and (6) that the acid-fast bacillus of the ozenatous crusts is an attenuated variety of the tubercle bacillus.

P. F.





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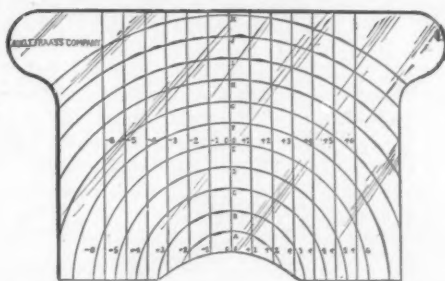
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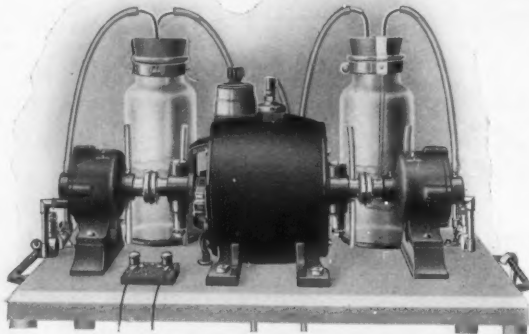
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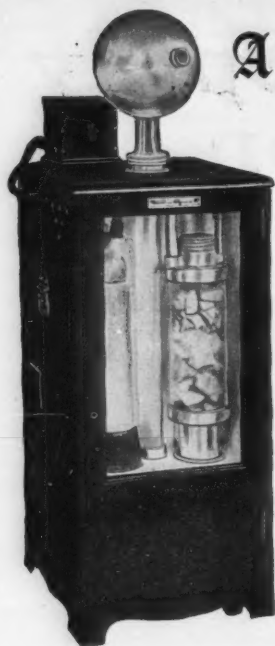
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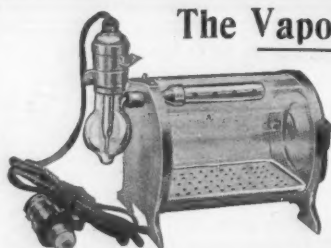
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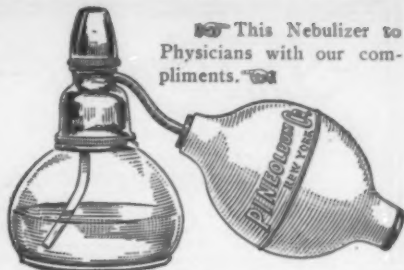
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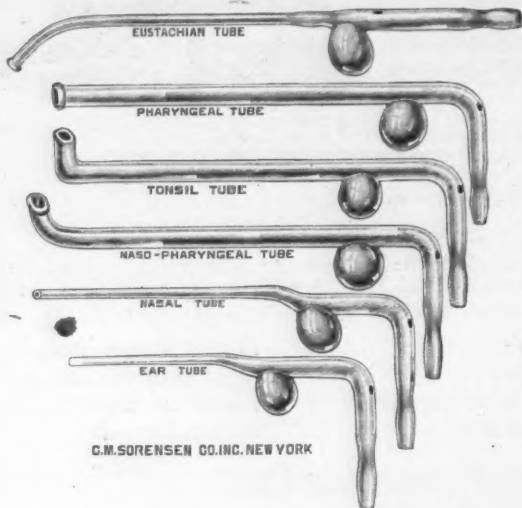


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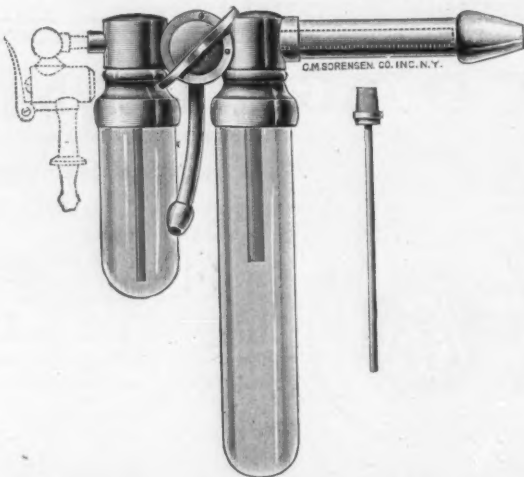
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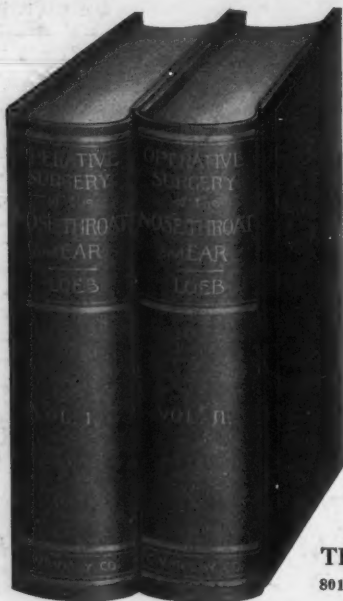
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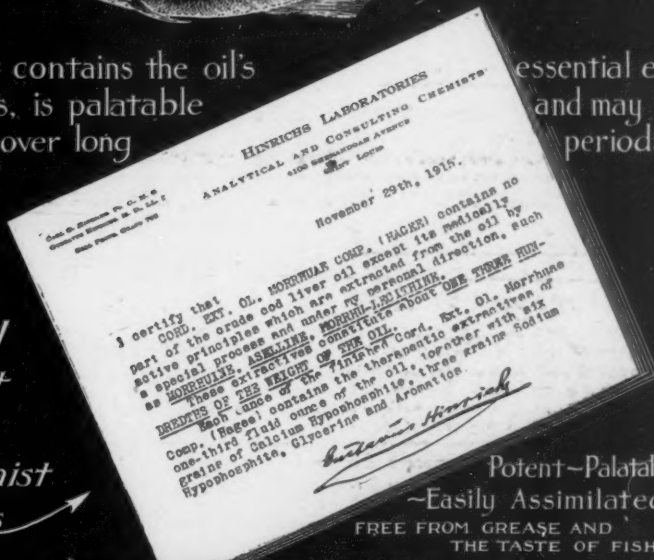
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